United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with the Republic of Palau, which includes the Palau Natural Resources Council, the Ministry of Resources and Development, the Palau Community College Cooperative Research and Extension Service, the Environmental Quality Protection Board, the National Emergency Management Office, the Palau Automated Land and Resource Information System, the Bureau of Arts and Culture, and the Palau Conservation Society

Soil Survey of the Islands of Palau, Republic of Palau

How To Use This Soil Survey

General Soil Maps

The general soil maps, which are color maps, show the survey area divided into groups of associated soils called general soil map units. These maps are useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the maps, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

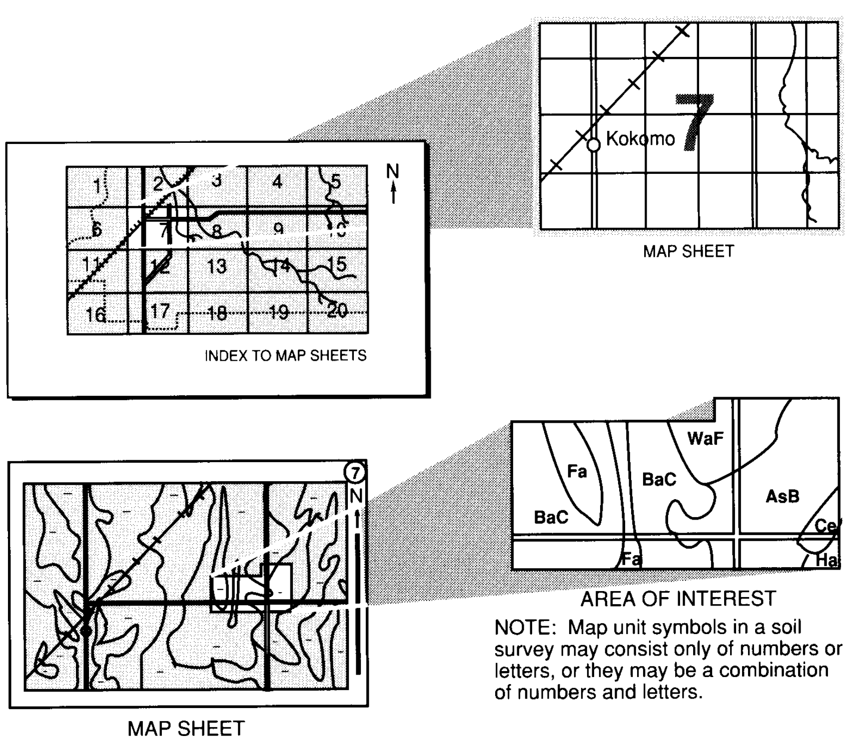
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service and the Republic of Palau, which includes the Palau Natural Resources Council, the Ministry of Resources and Development, the Palau Community College Cooperative Research and Extension Service, the Environmental Quality Protection Board, the National Emergency Management Office, the Palau Automated Land and Resource Information System, the Bureau of Arts and Culture, and the Palau Conservation Society. The survey is part of the technical assistance furnished to the Republic of Palau.

Major fieldwork for this soil survey was completed in 2006. Soil names and descriptions were approved in 2007. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2006. The most current official data are available on the Internet.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale. The maps are in digital form. Digitizing of the maps was completed in accordance with the Soil Survey Geographic (SSURGO) database standards. The digital SSURGO-certified maps are the official maps for the survey area and are part of the FOTG at the local field office of the Natural Resources Conservation Service.

Nondiscrimination Statement

Citation

The correct citation for this survey is as follows:

United States Department of Agriculture, Natural Resources Conservation Service. 2009. Soil survey of the Islands of Palau, Republic of Palau. Accessible online at: http://soils.usda.gov/survey/printed_surveys/.

Cover Caption

View south toward Arakabesan Island (foreground) and the Rock Islands (background). An area of MLRA 193 (Volcanic Islands of Western Micronesia) is in the foreground, and an area of MLRA 194 (Low Limestone Islands of Western Micronesia) is in the background.

Contents

Issued 2011

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of National and State governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Lawrence T. Yamamoto
Director, Pacific Islands Area
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Soil Survey of
The Islands of Palau, Republic of Palau

By Jason L. Nemecek and Robert T. Gavenda, Natural Resources Conservation Service

Fieldwork by Jason L. Nemecek, Robert T. Gavenda, and Joseph P. Seney updating the work of Christopher W. Smith and Neil R. Babik

Technical edit by Kit Paris

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Republic of Palau, which includes the Palau Natural Resources Council, the Ministry of Resources and Development, the Palau Community College Cooperative Research and Extension Service, the Environmental Quality Protection Board, the National Emergency Management Office, the Palau Automated Land and Resource Information System, the Bureau of Arts and Culture, and the Palau Conservation Society

This soil survey updates the *Soil Survey of Islands of Palau, Republic of Palau*, published in 1983 (Smith, 1983). It provides additional information, covers the entire country, and has larger maps on updated imagery with corrected projection. The larger maps show the soils in greater detail.

General Nature of the Survey Area

By Christopher W. Smith and Jason L. Nemecek, Natural Resources Conservation Service.

The Islands of Palau are in the western part of the Pacific Ocean. The survey area is about 250 kilometers north of the Equator and about 340 kilometers east of the Philippines Islands (fig. 1). It lies within a reef system that is about 80 kilometers long and 27 kilometers wide at its widest point. Most of the reefs are barrier reefs, but some are fringing reefs. All of the islands in the area are inside of the reef system, except for Angaur, which lies across a deep channel off the southern tip of the system. The survey area is about 461 square kilometers (178 square miles), or 46,184 hectares (114,122 acres), in size. The town of Koror, on the island of Koror, is the commercial center of the country. The national capital is located in Melekeok (fig.2). In 2007, the population of the survey area was about 20,842.

The atolls of the Southwest Islands make up the southernmost part of the survey area. Several hundred miles to the north are the level to extremely steep, raised, and low coral limestone islands of Angaur, Ngedebus, and Peleliu. The south-central part of the area consists of high, raised, extremely steep coral limestone islands known locally as the “Rock Islands.” Beginning in the central part and continuing north are the level to very steep, high volcanic islands of Malakal, Koror, Arakabesan, and

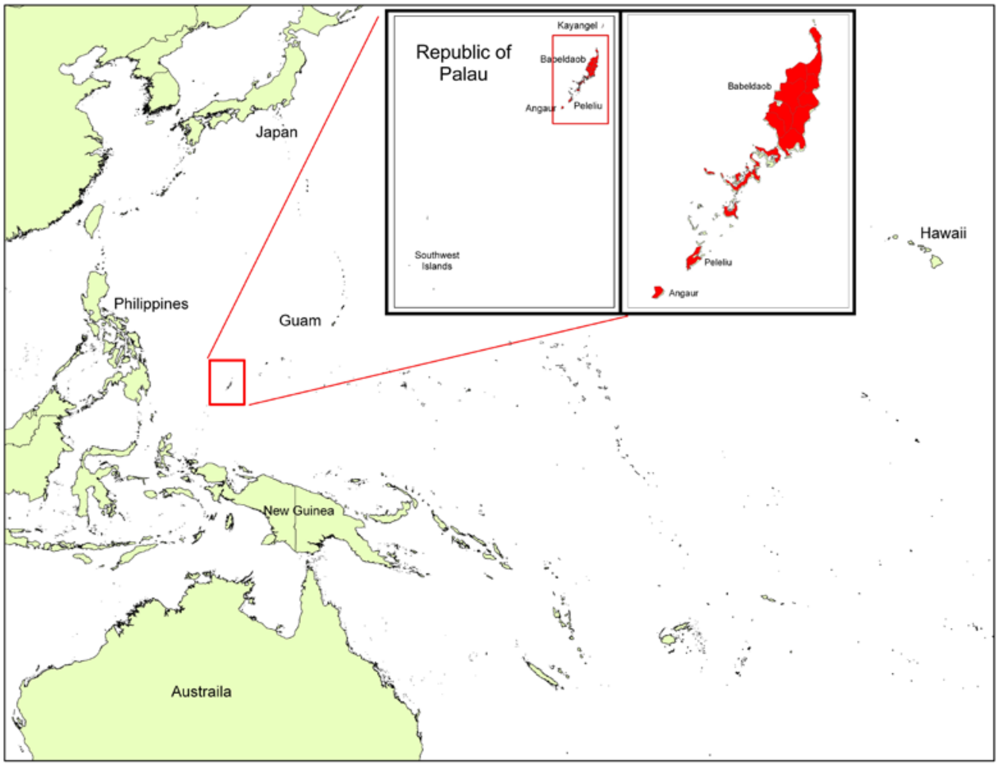

Figure 1.—Location of the Islands of Palau, Republic of Palau.

Babeldaob. These islands are characterized by deep dendritic drainageways and generally rounded hills. Beyond Babeldaob to the north is the Kayangel atoll.

Subsistence crop production is the main agricultural enterprise in the survey area. The major agroforestry ground crops include beans, cassava, kang kong, melon, peppers, noni, okra, pineapple, pumpkin, squash, sugarcane, taro, and yams. Agroforestry tree crops include avocados, bananas, betel nut, breadfruit, football fruit, guava, Inocarpus fagifer (keam), lemons, mango, medicinal plants, mountain apple, morinda citrifolia (ngel), star fruit, amara tree (titimel), and tropical almond.

Soil scientists determined that the survey area has about 32 major kinds of soil. The soils range widely in texture, natural drainage, depth, fertility, and other characteristics. Soils on coral limestone islands are nearly level, somewhat excessively drained, shallow, and loamy and are associated with areas of rock outcrop. On the volcanic islands, the upland soils generally are nearly level to steep, well drained, and fine textured. Most of these soils are well suited to the production of agricultural forest crops and to woodland. If careful management is applied, the soils also support a sustained yield of clean-tilled crops. In some areas degraded or eroded soils can be reclaimed by reforestation.

The soils on bottom lands are level or nearly level, very poorly drained, and fine textured or mucky. They are mostly in small areas adjacent to the coast. They are well suited to the production of wetland taro.

Mangrove forest is along most of the coastline of the volcanic islands and along the northern end of the island of Peleliu.

A report entitled “Military Geology of Palau Islands, Caroline Islands,” published in 1956, includes information about the soils in this survey area. This report provided a sound basis for the USDA publication *Soil Survey of Islands of Palau, Republic of Palau* published in 1983 (Smith, 1983). The present survey updates these earlier reports and provides new soil interpretation reports and a soil map suitable for use

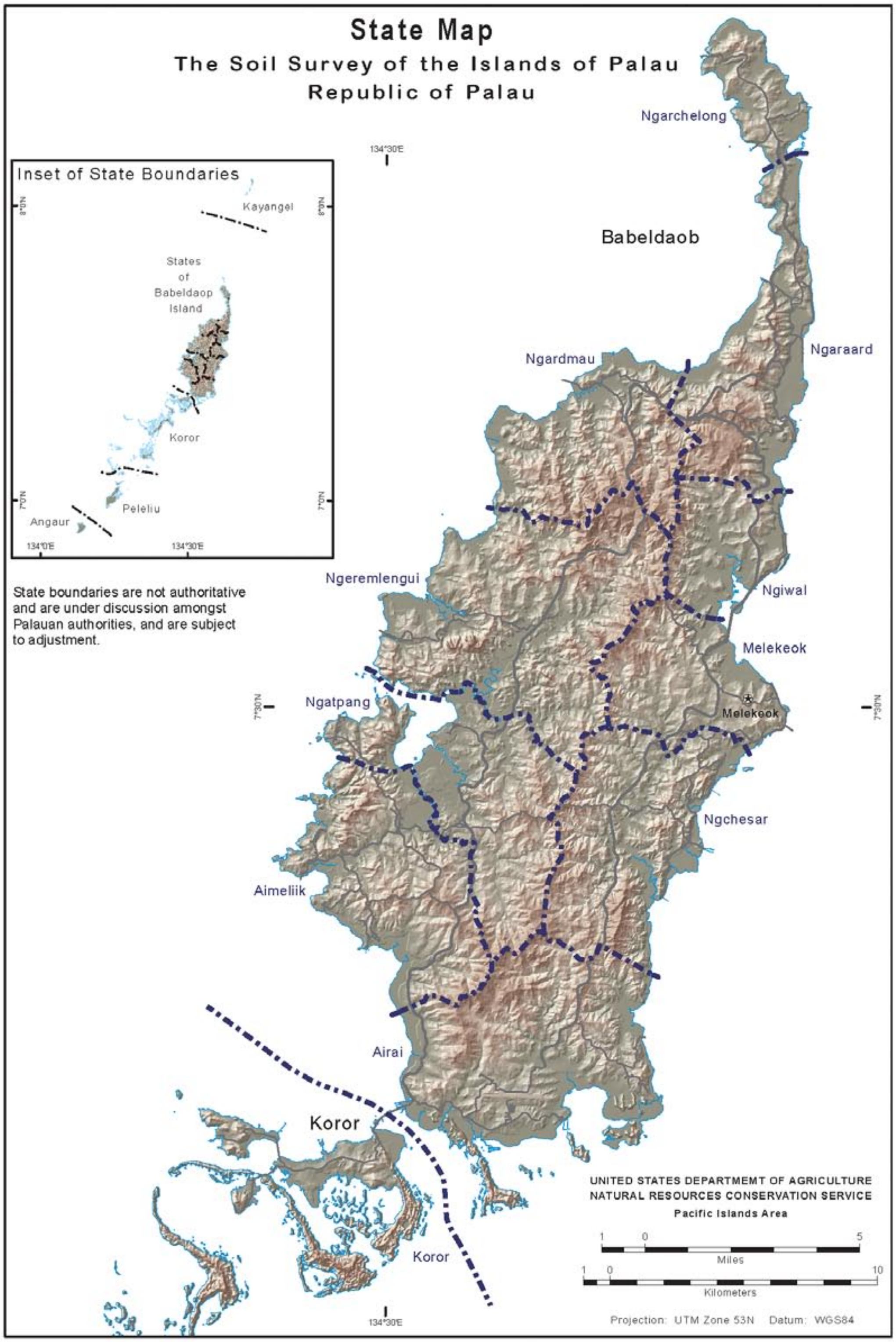

Figure 2.—The approximate State boundaries in most of Palau. The States in the Southwest Islands are not shown.

in geographic information systems (GIS), which will increase the usefulness of the survey. Some of the soil names used in the older reports are used in the present survey; therefore, the reader can refer to the older reports for some of the chemical and engineering properties for these soils and for some agricultural interpretations.

History

The original settlers in Palau were likely from Southeast Asia and/or Melanesia. Initial human colonization of the Palau Islands may have occurred more than 4,000 years ago, as is indicated by the presence of introduced giant swamp taro and a significant increase in anthropogenic disturbance indicators, such as charcoal, grass pollen, and *Lycopodium* (Athens and Ward, 2005). By about 3,000 BP, there was probably an extensive conversion of primary forest to swidden agriculture and other activities. There was an extensive network of constructed terraces (figs. 3, 4, 5, and 6). Construction and maintenance of these terraces may have contributed to erosion that built up wetland soils.

In 1543, Spanish explorer Ruiz Lopez de Villalobos was the first European to have sighted the islands of Palau. The Caroline Islands were nominally under Spanish control for several hundred years until the Spanish-American War of 1898. Spain sold the islands to Germany in 1899. The German administration of the islands developed fisheries, established coconut plantations, introduced cassava, and possibly introduced mahogany. The Germans discovered phosphate on Angaur in 1903. Starting in 1909, the phosphate was mined for export. Germany governed the islands until 1914, when Japan acquired control of the Micronesia Islands because of a mandate under the League of Nations.

The Japanese civilian population and trading increased during the 30-year Japanese period (1914-1944). Infrastructure, including roads and buildings, was expanded under Japanese control. By the start of World War II, the Japanese civilian population in Palau increased to about 18,000, three times the Palauan population. Agricultural settlements were established on Babeldaob, and large bauxite mining projects were initiated (fig. 7). If revegetation of the bauxite mines was attempted, the vegetation did not become established. Because of the extreme infertility of the soil, the areas that were mined for bauxite remain largely unvegetated today, nearly seven decades after mining activity stopped. The bauxite mines are a continual source of eroded sediment (fig. 8).

The Japanese built fortifications on the main Palau Islands during World War II. Slit trenches and gun emplacements remain open today, hidden by vegetation. Peleliu and Angaur Islands were the scenes of fierce battles between Japanese and American forces in 1944. Koror and Babeldaob were not invaded but were heavily bombed.

After World War II, the United States took over administration of Palau as part of the Trust Territories of the Pacific Islands mandated by the United Nations. Palau became an independent republic on October 1, 1994, but it continues to have economic ties to the United States through the Compact of Free Association.

The spellings of Palauan place names need some explanation:

> Spellings of place names in the Palau Islands are inconsistent because of the heterogeneous origins resulting from four foreign administrations within a single life span. Each administration creditably continued the use of native names, with negligible exceptions, but all of the four superimposed languages were quite different from the native tongue, and none were suited to express in writing many of the sounds of the Palauan language. . . . Many geographic names became established by their early appearance on charts prepared from the records of discoverers who many times were linguistically uncritical. Other names became established during the various administrations and reflect the various tongues which recorded them. (US DOD, 1956)

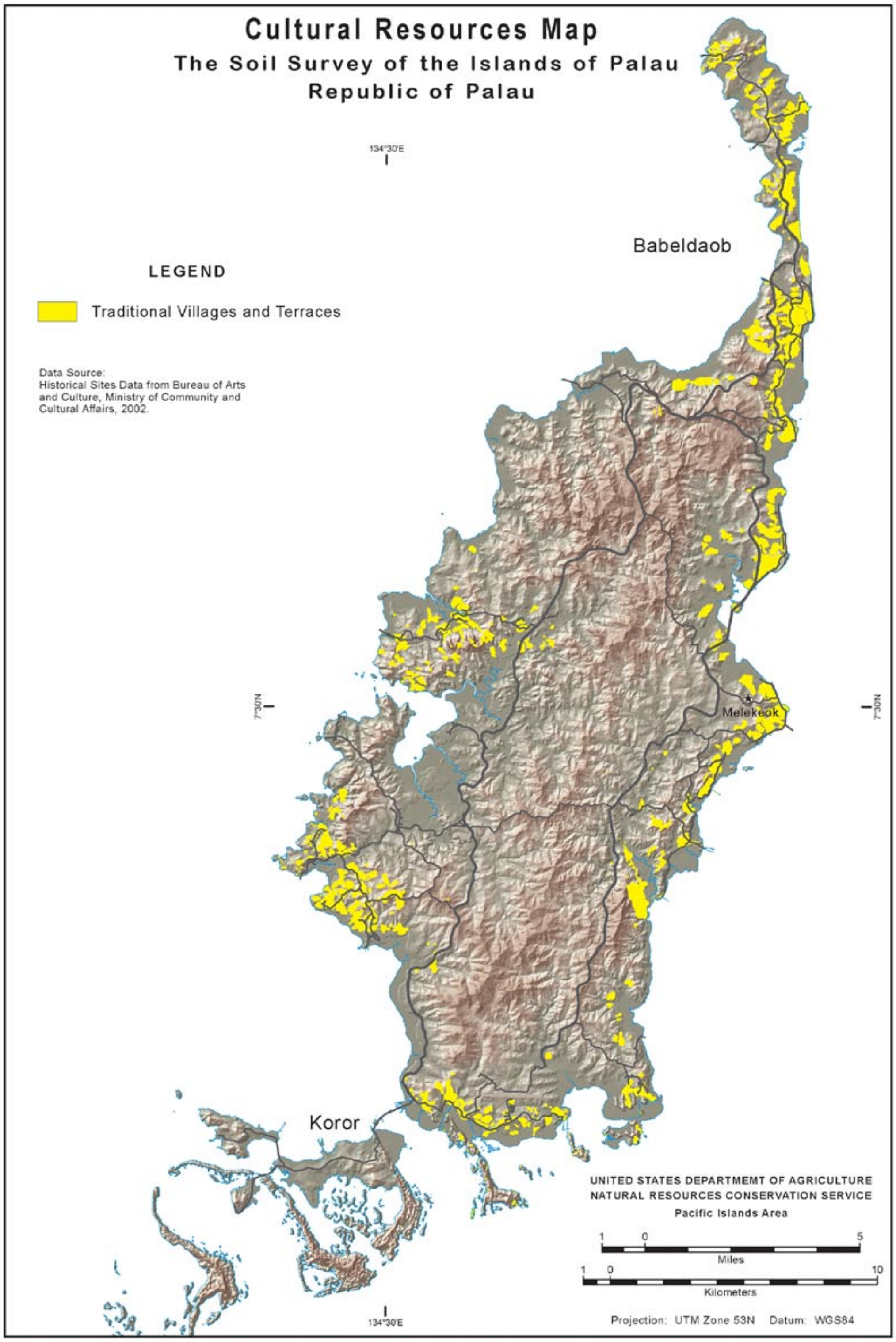

Figure 3.—The distribution of traditional villages and terraces on the island of Babeldaob.

Some of the names of soil series were established more than 50 years ago, and the common spellings have changed over the years. For example, Babeldaob Island was formerly spelled “Babelthuap,” and the soil series named after the island retains that spelling.

Figure 4.—Ancient manmade terraces on volcanic landscapes on Babeldaob Island. Palau soils are in many of these areas. Some terraces have been constructed on steep landslide scarps. Photo courtesy of Dr. Pat Colin, Coral Reef Research Foundation.

Figure 5.—Ancient manmade terraces in areas of Palau soils under grass on the western coast of Babeldaob Island. Fire-resistant pandanus trees remain on the grassland. The forested area consists primarily of Aimeliik soils.

Figure 6.—Ancient manmade terraces in areas of Palau soils under grasses in Aimeliik State, Babeldaob Island. The lower terrace on the left was cut to make the flat surface, and the fill was deposited to make the upper terrace on the right. Fire-resistant pandanus trees remain on the grassland. The forested area consists primarily of Aimeliik soils.

Figure 7.—An abandoned bauxite mine in an area of map unit 653 (Typic Udorthents, complex, mined, 0 to 75 percent slopes) in Ngardmau State, Babeldaob Island. Note the sparse vegetation and the eroded hillsides. Photo courtesy of Dr. Pat Colin, Coral Reef Research Foundation.

Figure 8.—An abandoned bauxite mine in an area of map unit 653 (Typic Udorthents complex, mined, 0 to 75 percent slopes) in Ngaremlengui State, Babeldaob Island. Because of extremely low soil fertility, revegetating and stabilizing this area are exceptionally challenging. Without vegetation to stabilize the area, erosion is a continual problem.

Climate

The Republic of Palau has a tropical moist climate. Table 1 gives temperature and rainfall data for Koror, Palau, for the period 1971 to 2000. The table shows the average daily maximum and minimum temperatures for each month, the average temperature for each month, and the average number of growing degree days for each month. The precipitation, or rainfall, is given as the average for each month, the low and high amounts of rain for each month in 2 out of 10 years, and the average number of days with 0.1 inch or more of rain. Annual rainfall averages about 148 inches and ranges from about 116 to 176 inches. Figure 9 shows the distribution of rainfall over the majority of Palau. Rainfall is derived from convective uplift, which results in short-duration rainstorms that are of high intensity and are irregularly distributed.

The Republic of Palau lies within the latitudinal zone that receives more solar radiation than it radiates back to space. This imbalance maintains the atmospheric temperatures in a quasi-steady state. The mean daily temperature throughout the year averages 27 degrees C; the mean diurnal range is about 7 degrees C. Relative humidity averages about 90 percent at night and 75 to 80 percent during the day.

Seasonal variation in the general tropical circulation pattern is influenced by the position of the Inter-Tropical Convergence Zone (ITCZ) and the latitudinal shift in the subtropical high-pressure zones. The subtropical high-pressure zones shift in response to seasonal changes in maximum solar angles and radiate heating. Heavy rainfall and thunderstorms occur as the ITCZ shifts across the islands.

The wet seasons (May to November) and dry seasons (December to April) affect the hydrological regimes of Peleliu and Angaur. Most of the soils on these islands are shallow over limestone and well drained or are in areas of coral sand, which is very

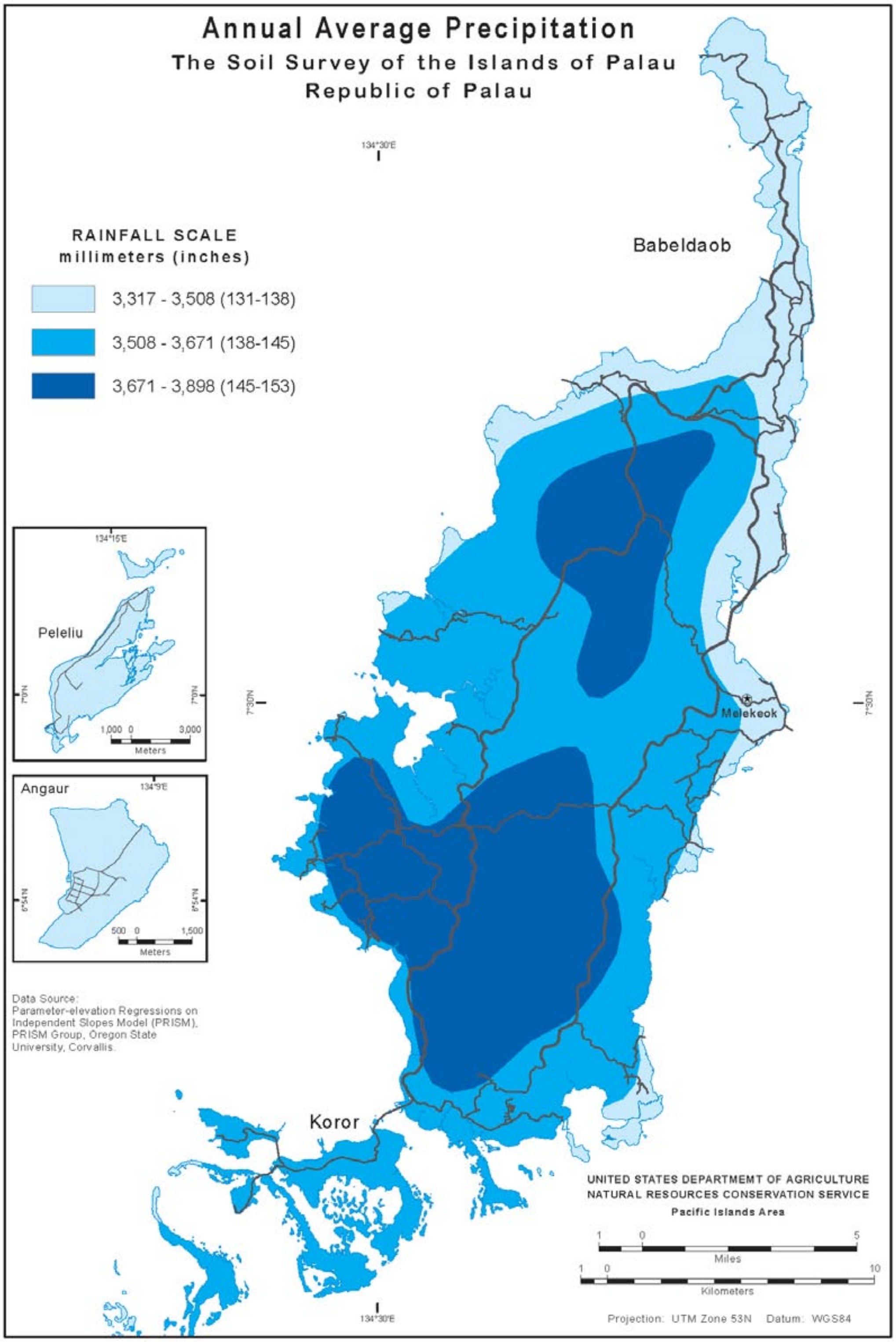

Figure 9.—Geographical distribution of the average annual rainfall on the main islands in Palau.

deep and excessively drained. The shallow soil profile and the topographical relief result in limited moisture storage capacities. The moisture content of the soil remains close to field capacity only during wet periods, rapidly falling below field capacity with moisture conditions at the wilting point during periods of drought.

Variability in rainfall also is linked to the periodic oscillation in the atmosphere-ocean system known as the El Nino Southern Oscillation (ENSO). The interval between ENSO events averages 7 years but ranges from 2 to 10 years. Strong ENSO events can result in droughty conditions. More than a few days without rain result in dry conditions. The droughty conditions stress the normally wet tropical forests and make them susceptible to fire. There is no topographically induced climate variability.

Prevailing trade winds average 13 kilometers per hour. They are from the northeast in winter and vary the rest of the year. Thunderstorms may be accompanied by severe downbursts of wind that may cause local damage. During the storms, damaging winds exceeding 100 kilometers per hour are infrequent. The islands are generally outside the major typhoon zone.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They excavated many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret

the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information and field experience of specialists.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs derived from satellite imagery and identified each as a specific map unit. Satellite imagery shows trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils on Bottom Lands

These soils make up about 17 percent of the survey area.

1. Mesei-Dechel-Ngersuul

Very deep, very poorly drained and somewhat poorly drained soils in areas of swamps and flood plains on valley floors on volcanic islands; formed in alluvial sediments or organic material over alluvial sediments derived from volcanic rock

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 80 meters (0 to 262 feet)
Landscape: Volcanic islands

Composition

Extent of the map unit in the survey area—about 5 percent
Extent of the components in the map unit:
Mesei soils—35 percent
Dechel soils—34 percent
Ngersuul soils—27 percent
Minor components—4 percent

Soil Properties and qualities

Mesei soils
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Parent material: Organic material over alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 1 percent

Depth class: Very deep
Drainage class: Very poorly drained

Dechel soils
Landform: Valley floors, swamps, stream terraces, marshes, backswamps
Geomorphic position: Treads, talf
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 2 percent
Depth class: Very deep
Drainage class: Very poorly drained

Ngersuul soils
Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Risers, treads, talf
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 4 percent
Depth class: Very deep
Drainage class: Somewhat poorly drained

Minor components

- Hydraquentic Humaquepts on valley floors
- Oxic Dystrudepts on dissected fluviomarine terraces on low hills
- Naniak soils in areas of brackish water adjacent to shores in mangrove swamps on volcanic islands

Use and management

Major uses.—These soils support wetland taro (*Crytosperma* and *Colocasia*) patches or swamp forest plant communities and are used for taro production, watershed, or wildlife habitat.

Management concerns.—These soils have a high water table, are susceptible to subsidence, and have poor engineering properties.

Management measures.—These include maintaining vegetation and water table levels, organic inputs, and turning of the soil. Taro yields can be increased by the use of green manure. Because of wetness and low strength, special measures, such as plies, are needed on sites for large structures, such as dams. If roads are constructed across this unit, a large volume of base material is needed to compensate for the low strength of the soils.

2. Odesangel

Very deep, very poorly drained soils in swamp areas of atolls and karst islands that retain fresh or brackish water; formed in deposits of organic material overlying coralline sand and/or limestone

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: 0 to 25 meters (0 to 82 feet)
Landscape: Rock Islands, atolls, raised coralline platform islands

Composition

Extent of the map unit in the survey area—1 percent
Extent of the components in the map unit:
Odesangel soils—80 percent

Minor components—20 percent

Soil Properties and qualities

Odesangel soils
Landform: Solution sinkholes, depressions, scalped areas, atolls
Geomorphic position: Dip
Parent material: Organic material derived dominantly from freshwater marsh vegetation overlying coralline sand and/or limestone
Slope: 0 to 1 percent
Depth class: Very deep
Drainage class: Very poorly drained

Minor components

- Ngerungor soils in depressions or on wet coastal bottom lands
- Typic Haplohemists on wet costal bottom lands
- Typic Udifolists on karrens of karst islands

Use and management

Major uses.—These soils are in areas of limestone marshes and swamp forest plant communities and are used mainly for the production of wetland taro. The dominant taro species is wetland taro (*Cyrtosperma chamissonis*).

Management concerns.—These soils have a high water table, are susceptible to subsidence, and have poor engineering properties.

Management measures.—These include maintaining vegetation and water table levels, organic inputs, and turning of the soil. Taro yields can be increased by the use of green manure. If roads are constructed across this unit, a large volume of base material is needed to compensate for the low strength of the soils.

3. Ilachetomel-Naniak-Chia

Very deep, very poorly drained in the intertidal zone of mangrove swamps adjacent to volcanic or karst islands; formed in organic deposits and alluvium derived from volcanic material or limestone

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia); 194 (Low Limestone Islands of Western Micronesia)
Elevation: -1 to 4 meters (-3 to 13 feet)
Landscape: Atolls, volcanic or karst islands

Composition

Extent of the map unit in the survey area—11 percent
Extent of the components in the map unit:
Ilachetomel soils—64 percent
Naniak Mesei soils—19 percent
Chia soils—15 percent
Minor components—2 percent

Soil Properties and qualities

Ilachetomel soils
Landform: Intertidal zone of mangrove swamps, salt marshes, tidal marshes
Geomorphic position: Talf
Parent material: Organic deposits derived dominantly from decomposing mangrove roots and litter

Slope: 0 to 1 percent
Depth class: Very deep
Drainage class: Very poorly drained

Naniak soils
Landform: Areas of brackish waters adjacent to shores, tidal marshes, mangrove swamps, salt marshes
Geomorphic position: Talf
Parent material: Organic deposits and alluvium derived from volcanic rock
Slope: 0 to 1 percent
Depth class: Very deep
Drainage class: Very poorly drained

Chia soils
Landform: Intertidal zone of tidal marshes, mangrove swamps, salt marshes
Geomorphic position: Talf
Parent material: Organic deposits derived dominantly from decomposing mangrove roots and litter over water-deposited coralline sand and gravel
Slope: 0 to 1 percent
Depth class: Very deep
Drainage class: Very poorly drained

Minor components

- Insak soils in areas of brackish water adjacent to shores in mangrove swamps on limestone islands
- Ngedebus soils on the lagoon side of atolls
- Mesei soils in backswamps on volcanic islands

Use and management

Major uses.—These soils are used for sediment catchment and some timber harvesting for local use.

Management concerns.—These soils have a high water table, are susceptible to subsidence, and have poor engineering properties. They are poorly suited to onsite waste disposal systems because of the hazard of seawater contamination, flooding, and wetness. Effluent may be washed into the lagoon with daily outflow of tidal waters and thus contaminate the adjacent lagoon and create a hazard to the health of swimmers and consumers of the sea life taken from these areas.

Management measures.—Clear cutting is not recommended. Maintaining the mangrove buffer between the land and the sea helps to protect the reefs from excessive sedimentation or eutrophication. Eutrophication will lead to coral reef degradation and stimulate algae growth on corals.

Soils on Marine Terraces

These soils make up about 4 percent of the survey area.

4. Tabecheding-Ngatpang-Dystrudepts

Very deep, somewhat poorly drained or moderately well drained soils on dissected fluviomarine terraces on volcanic islands; formed in interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 113 meters (0 to 371 feet)

Landscape: Volcanic islands

Composition

Extent of the map unit in the survey area—about 4 percent
Extent of the components in the map unit:
Tabecheding soils—34 percent
Ngatpang soils—32 percent
Dystrudepts Mesei soils—30 percent
Minor components—4 percent

Soil Properties and qualities

Tabecheding soils
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, footslopes, backslopes
Geomorphic position: Crests, side slopes
Parent material: Interbedded, clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airai clay formation
Slope: 2 to 50 percent
Depth class: Very deep
Drainage class: Somewhat poorly drained

Ngatpang soils
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, footslopes, backslopes
Parent material: Interbedded, clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airai clay formation
Slope: 2 to 50 percent
Depth class: Very deep
Drainage class: Moderately well drained

Dystrudepts
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, footslopes, summits, shoulders, backslopes
Parent material: Interbedded, clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airai clay formation
Slope: 2 to 50 percent
Depth class: Very deep
Drainage class: Moderately well drained or somewhat poorly drained

Minor components

- Lithic Haploperox on dissected fluviomarine terraces on low hills

Use and management

Major uses.—These soils support lowland forests and wet savannah plant communities and are used for native vegetation, watershed, subsistence farming, pottery, or timber harvesting.

Management concerns.—These soils are limited mainly by low strength, slope, wetness, and infertility. They generally have high levels of soluble aluminum. Septic tank absorption fields do not perform well because the rate of water movement through the soils is too slow. The soils have some lignite, a low-grade form of coal that readily transmits water and therefore can destabilize slopes. Lignite in Palau is characterized by very high acidity, which prevents revegetation without considerable remediation.

Management measures.—Maintaining vegetation helps to keep slopes from slumping. Drainage pipes should be installed under roads and near buildings. Adding

organic matter allows the soils to retain and recycle nutrients. Adding lime (crushed coral) helps to lower acidity and toxic aluminum levels in the soils. Clear cutting is not recommended

Soils on Volcanic Uplands

These soils make up about 62 percent of the survey area.

5. Aimeliik-Palau

Very deep, well drained soils in all hillslope positions on hills and on ancient anthropogenic terraces of volcanic islands; formed in saprolite derived from volcanic rock

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 231 meters (3 to 758 feet)
Landscape: Volcanic islands

Composition

Extent of the map unit in the survey area—about 49 percent
Extent of the components in the map unit:
Aimeliik soils—45 percent
Palau soils—40 percent
Minor components—15 percent

Soil Properties and qualities

Aimeliik soils
Landform: Hills
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Side slopes, base slopes, nose slopes, head slopes, interfluves, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 75 percent
Depth class: Very deep
Drainage class: Well drained

Palau soils
Landform: Hills and anthropogenic terraces
Hillslope position: Toeslopes, backslopes, summits, shoulders, footslopes
Geomorphic position: Side slopes, base slopes, nose slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 75 percent
Depth class: Very deep
Drainage class: Well drained

Minor components

- Typic Udorthents on the erosional crests and ridges of hills
- Oxyaquic Dystrudepts in drainageways and swales on hills
- Babelthuap soils on the erosional crests and ridges of hills

Use and management

Major uses.—These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or slash and burn or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Management concerns.—These soils are susceptible to landslides if vegetation is removed. Removing vegetation decreases the amount of water that can be drawn out of the soils. Therefore, the soils may become saturated more readily. This saturation adds weight to the slope and may destabilize it. Other major management concerns are low soil strength, slope, soil degradation, and the hazard of erosion.

Management measures.—Measures that maintain vegetation and soil fertility in the upper 10 centimeters (4 inches) of the soils are needed. If topsoil is removed, reestablishing it is very difficult. Topsoil can be stockpiled and used to reclaim areas disturbed during construction.

Adding organic matter allows the soils to retain and recycle nutrients. Adding lime (crushed coral) lowers the acidity and toxic aluminum level in the soils. To minimize the risk or erosion and loss of fertility, only small areas of forestland should be cleared for planting. Clear cutting is not recommended.

6. Babelthuap-Ngardmau-Udorthents

Very deep, well drained soils on erosional hills on volcanic islands; formed in saprolite derived from volcanic rock

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 234 meters (3 to 768 feet)
Landscape: Volcanic islands

Composition

Extent of the map unit in the survey area—about 8 percent
Extent of the components in the map unit:
Babelthuap soils—43 percent
Ngardmau soils—36 percent
Udorthents Mesei soils—16 percent
Minor components—5 percent

Soil Properties and qualities

Babelthuap soils
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 6 percent
Depth class: Very deep
Drainage class: Well drained

Ngardmau soils
Landform: Erosional crests and ridges on hills
Hillslope position: Summits, backslopes, shoulders
Geomorphic position: Side slopes, crests

Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Depth class: Very deep
Drainage class: Well drained

Udorthents
Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 20 to 50 percent
Depth class: Very deep
Drainage class: Well drained

Minor components

- Palau soils on hillslopes and anthropogenic terraces
- Aimeliik soils on upland volcanic hills

Use and management

Major uses.—These soils support fern-land plant communities and generally are used only for watershed. A few areas are mined for bauxite.

Management concerns.—These soils are high in soluble aluminum; Al-toxicity stunts root growth, thereby limiting the amount of soil the plant can exploit for nutrients. Removal of toeslope material or supporting earth can result in landslides. Other major management concerns are low soil strength, very low soil fertility, slope, soil degradation, and the hazard of erosion.

Management measures.—Reforestation is needed. This can be done by adding organic matter, which allows the soils to retain and recycle nutrients. Adding lime (crushed coral) lowers the acidity and toxic aluminum level in the soils. Planting acacia trees is beneficial because these trees take nitrogen from the air and add it to the soils.

7. Udorthents-Urban Land

Built-up areas, quarries, bauxite surface mines, and nearly level to very steep, very deep, well drained soils consisting of bauxite, human-transported material, or coral fill over saprolite derived from volcanic rock

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 221 meters (0 to 725 feet)
Landscape: Volcanic islands

Composition

Extent of the map unit in the survey area—about 1 percent
Extent of the components in the map unit:
Udorthents—47 percent
Urban land—34 percent
Minor components—19 percent

Soil Properties and qualities

Udorthents
Landform: Scalped areas, leveled land, erosional crests and ridges on hills

Hillslope position: Backslopes, summits, shoulders
Geomorphic position: Side slopes, crests
Parent material: Bauxite, crushed coral, clayey soil material, basalt rock fragments, or human-transported material composed of saprolite derived from volcanic rock
Slope: 0 to 75 percent
Depth class: Very deep
Drainage class: Well drained

Urban land
Landform: Urban land
Kind of material: Human-transported material
Slope: 0 to 50 percent

Minor components

- Ngardmau and Babelthuap soils on the erosional crests and ridges of hills
- Quarries
- Palau soils on hillslopes and anthropogenic terraces

Use and management

Major uses.—These areas are used mainly for mining or for homesite development, roads, or other kinds of urban development.

Management concerns.—Areas where clayey material is the dominant fill material are poorly suited to use as a source of roadfill, to septic tank absorption fields, and to the construction of roads. The main limitations affecting these uses are low soil strength and restricted permeability.

Management measures.—Adding an adequate amount of crushed coral or basalt ballast during the construction of roads helps to overcome low strength. Increasing the size of septic tank absorption fields helps to overcome the restricted permeability.

8. Ollei-Nekken

Moderately deep or shallow, well drained soils on coastal benches and ridges on hills on volcanic islands; formed in residuum derived from volcanic rock

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 213 meters (3 to 699 feet)
Landscape: Volcanic islands

Composition

Extent of the map unit in the survey area—about 4 percent
Extent of the components in the map unit:
Ollei soils—43 percent
Nekken soils—30 percent
Minor components—27 percent

Soil Properties and qualities

Nekken soils
Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation

Slope: 12 to 75 percent
Depth class: Moderately deep
Drainage class: Well drained

Ollei soils
Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation
Slope: 12 to 75 percent
Depth class: Shallow
Drainage class: Well drained

Minor components

- Aimeliik soils on hills
- Rock outcrop on ridges
- Dechel soils in swamps on valley floors

Use and management

Major uses.—These soils support Ollei-Nekken-outcrop forest vegetation communities and are used only for watershed, as sources of rock, for recreation, and for a minor amount of timber harvesting for village use. An obvious indicator of this forest type is *Heterospathe elata* var. *palauensis* (demaile).

Management concerns.—The main management concerns are a shallow rooting depth, slope, the hazard of erosion, doughtiness, soil degradation, and rock fragments on the surface.

Management measures.—The cover of vegetation should be maintained, and clear cutting should be avoided. Structures that divert runoff are needed if buildings and roads are constructed in areas of this unit. Topsoil can be stockpiled and used to reclaim areas disturbed by cutting and filling.

Soils in Areas of Limestone

These soils make up about 14 percent of the survey area.

9. Peleliu-Chelbacheb

Shallow, well drained soils on karst islands; formed in coralline colluvium or organic material over residuum weathered from limestone

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: 1 to 214 meters (3 to 702 feet)
Landscape: Rock islands, raised coralline platform islands

Composition

Extent of the map unit in the survey area—about 14 percent
Extent of the components in the map unit:
Peleliu soils—47 percent
Chelbacheb soils—27 percent
Minor components—26 percent

Soil Properties and qualities

Peleliu soils
Landform: Wave-cut platforms, solution platforms, karrens
Hillslope position: Summits, shoulders, toeslopes, backslopes, footslopes
Geomorphic position: Base slopes, side slope
Parent material: Coralline colluvium over residuum weathered from limestone; probably includes additions of volcanic ash and tropospheric dust; the bedrock includes the Peleliu and Palau Limestone Formations
Slope: 0 to 150 percent
Depth class: Shallow
Drainage class: Well drained

Chelbacheb soils
Landform: Karrens, karst cones, karst towers, karst valleys
Hillslope position: Summits, backslopes, shoulders, toeslopes, footslopes
Geomorphic position: Base slopes, back slopes
Parent material: Organic material over residuum weathered from coral limestone
Slope: 50 to 150 percent
Depth class: Shallow
Drainage class: Well drained

Minor components

- Odesangel soils on anthropogenic fens
- Ngedebus soils on beach terraces of karst islands
- Rock outcrop on the crests of solution platforms and rock islands

Use and management

Major uses.—These soils are in broadleaf-evergreen limestone forests and are used for watershed; as sources of fuel wood; and for recreation, phosphate mining, and limited amounts of timber harvesting for village use. A few areas have been cleared and developed for small garden plots.

Management concerns.—These soils are poorly suited to subsistence forest-crop production. The main limitations are a restricted rooting depth, rock fragments on the surface and in the soils, and areas of rock outcrop.

Management measures.—The cover of vegetation should be maintained. Some areas within the limestone forests could be used for agroforestry systems, but they may require outside input of plant nutrients to maintain productivity if relatively large amounts of biomass are removed during harvest. Clear cutting is not recommended. The rock islands should be preserved for their esthetic value.

Soils on Coral Sand Atolls

These soils make up about 3 percent of the survey area.

10. Ngedebus-Majuro

Very deep, somewhat excessively drained soils on beach terraces in areas of atolls, karst, and volcanic islands; formed in water- and wind-deposited coralline sandy material

Map unit setting

Major land resource area: 196 (Coral Atolls of Micronesia)
Elevation: 0 to 6 meters (0 to 20 feet)
Landscape: Atolls, rock islands, raised solution platform islands

Composition

Extent of the map unit in the survey area—about 3 percent
Extent of the components in the map unit:
Ngedebus soils—67 percent
Majuro soils—19 percent
Minor components—14 percent

Soil Properties and qualities

Ngedebus soils
Landform: Beach terraces, back-barrier beaches, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Risers, treads
Parent material: Water- and wind-deposited coralline sandy material
Slope: 0 to 3 percent
Depth class: Very deep
Drainage class: Somewhat excessively drained

Majuro soils
Landform: Back-barrier flats, beach terraces, beach ridges, beaches, generally on the oceanside of atolls
Hillslope position: Toeslopes
Geomorphic position: Risers, treads
Parent material: Water- and wind-deposited coralline rubble and sandy material
Slope: 2 to 6 percent
Depth class: Very deep
Drainage class: Somewhat excessively drained

Minor components

- Beaches on atolls
- Odesangel soils in scalped areas and depressions on atolls
- Typic Udipsamments on beach terraces, back-barrier beaches, other beaches, and beach ridges

Use and management

Major uses.—These soils support casuarina and atoll forest plant communities and are used as native forests, as sources of fuel wood, and for agroforestry. A few areas are used for homesite or recreational development.

Management concerns.—The main management concern is the hazard of flooding during high-intensity storms. If the soils are used as sites for sanitary facilities, the main limitation is a poor filtering capacity, which can result in contamination of ground water. Depth to the water table is 105 to more than 150 centimeters (about 41 to more than 58.5 inches). In some areas excavation is difficult because of cobbles on the surface.

Management measures.—The cover of vegetation should be maintained. Clear cutting is not recommended. If this unit is used for subsistence agriculture, nitrogen and potassium should be added to the soils. These soils are low in iron, manganese, and zinc; therefore, ferrous sulfate, manganese, and zinc sulfate should be applied annually. The hazard of flooding can be reduced by building structures on raised foundations.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the

detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Aimeliik silt loam, 6 to 12 percent slopes, is a phase of the Aimeliik series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Chia-Insak complex, 0 to 1 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Quarry is an example.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

600—Aimeliik silt loam, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 155 meters (3 to 509 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—85 percent
Minor components—15 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Backslopes, summits, shoulders, toeslopes, footslopes
Geomorphic position: Side slopes, head slopes, interfluves, nose slopes, crests, base slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.3 centimeters (7.2 inches); moderate

Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 14 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very low
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
A—3 to 7 centimeters (1 to 3 inches); silt loam
BA—7 to 18 centimeters (3 to 7 inches); silty clay
Bto—18 to 82 centimeters (7 to 32 inches); silty clay
BCt—82 to 93 centimeters (32 to 37 inches); clay loam
C—93 to 200 centimeters (37 to 79 inches); loam

Minor components

Ngersuul soils
Percentage of component in the map unit: About 5 percent
Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, footslopes, backslopes
Geomorphic position: Interfluves, side slopes
Slope: 2 to 8 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Hills
Hillslope position: Summits, toeslopes, shoulders, footslopes, backslopes
Geomorphic position: Base slopes, nose slopes, interfluves, crests, head slopes, side slopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

601—Aimeliik silt loam, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 185 meters (3 to 607 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—85 percent
Minor components—15 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Shoulders, summits, backslopes, footslopes, toeslopes
Geomorphic position: Crests, side slopes, interfluves, head slopes, nose slopes, base slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 40 centimeters (4 to 16 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.0 centimeters (7.1 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
A—3 to 12 centimeters (1 to 5 inches); silt loam
Bto—12 to 86 centimeters (5 to 34 inches); silty clay
C—86 to 200 centimeters (34 to 79 inches); silty clay

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 5 percent

Landform: Drainageways, swales, hills
Hillslope position: Backslopes, footslopes, toeslopes
Geomorphic position: Side slopes, interfluves
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Hills
Hillslope position: Backslopes, summits, shoulders, toeslopes, footslopes
Geomorphic position: Crests, interfluves, side slopes, head slopes, nose slopes, base slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, levees, flood plains, valley floors
Geomorphic position: Treads, risers
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Dechel soils
Percentage of component in the map unit: About 2 percent
Landform: Swamps, valley floors, stream terraces, marshes, backswamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

602—Aimeliik silt loam, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 231 meters (3 to 758 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—85 percent
Minor components—15 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Backslopes, summits, shoulders, toeslopes, footslopes
Geomorphic position: Base slopes, interfluves, crests, head slopes, side slopes, nose slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 30 centimeters (4 to 12 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.3 centimeters (7.6 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
A—3 to 12 centimeters (1 to 5 inches); silt loam
AB—12 to 26 centimeters (5 to 10 inches); silt loam
Bto—26 to 52 centimeters (10 to 20 inches); silty clay loam
CBt—52 to 200 centimeters (20 to 79 inches); silty clay loam

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 6 percent
Landform: Drainageways, swales, hills
Hillslope position: Footslopes, toeslopes, backslopes
Geomorphic position: Interfluves, side slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Dechel soils
Percentage of component in the map unit: About 4 percent
Landform: Valley floors, swamps, stream terraces, backswamps, marshes
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear

Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Shoulders, footslopes, summits, backslopes, toeslopes
Geomorphic position: Crests, head slopes, interfluves, side slopes, base slopes, nose slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

603—Aimeliik silt loam, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 213 meters (3 to 699 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—85 percent
Minor components—15 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Footslopes, toeslopes, shoulders, backslopes, summits
Geomorphic position: Side slopes, interfluves, base slopes, nose slopes, head slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 25 centimeters (4 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high

Available water capacity: About 17.2 centimeters (6.8 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 7 centimeters (0 to 3 inches); slightly decomposed plant material
AB—7 to 12 centimeters (3 to 5 inches); silt loam
Bto—12 to 96 centimeters (5 to 38 inches); silty clay loam
C—96 to 200 centimeters (38 to 79 inches); silty clay

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 6 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, footslopes, backslopes
Geomorphic position: Side slopes, interfluves
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Dechel soils
Percentage of component in the map unit: About 4 percent
Landform: Swamps, valley floors, stream terraces, marshes, backswamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, flood plains, valley floors, levees
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Mesei soils

Percentage of component in the map unit: About 2 percent
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 25 centimeters (10 inches)
Total subsidence: About 102 centimeters (40 inches)

604—Aimeliik silt loam, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 230 meters (3 to 755 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—85 percent
Minor components—15 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Backslopes, toeslopes, footslopes, shoulders, summits
Geomorphic position: Crests, interfluves, side slopes, base slopes, nose slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 17.6 centimeters (6.9 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 83 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None

Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile

Oi—0 to 4 centimeters (0 to 2 inches); slightly decomposed plant material
A—4 to 8 centimeters (2 to 3 inches); silt loam
Bto—8 to 86 centimeters (3 to 34 inches); silty clay loam
C—86 to 200 centimeters (34 to 79 inches); silty clay

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 6 percent
Landform: Drainageways, swales, hills
Hillslope position: Backslopes, footslopes, toeslopes
Geomorphic position: Interfluves, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngersuul soils
Percentage of component in the map unit: About 4 percent
Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Treads, risers
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Swamps, valley floors, stream terraces, marshes, backswamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Mesei soils
Percentage of component in the map unit: About 2 percent
Landform: Valley floors, swamps, backswamps, marshes, stream terraces
Geomorphic position: Treads
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 25 centimeters (10 inches)
Total subsidence: About 102 centimeters (40 inches)

605—Aimeliik silt loam, bedded tuff substratum, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 12 to 128 meters (39 to 420 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik, bedded tuff substratum, and similar soils—85 percent
Minor components—15 percent

Characteristics of Aimeliik silt loam, bedded tuff substratum

Landform: Hills
Hillslope position: Summits, footslopes, shoulders, backslopes, toeslopes
Geomorphic position: Crests, interfluves, side slopes, base slopes, nose slopes, head slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 25 centimeters (4 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.6 centimeters (7.3 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very low
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 4 centimeters (0 to 2 inches); slightly decomposed plant material
A—4 to 18 centimeters (2 to 7 inches); silt loam
Bto—18 to 64 centimeters (7 to 25 inches); silty clay
C—64 to 200 centimeters (25 to 79 inches); silty clay loam

Minor components

Oxyaquic Dystrudepts, bedded tuff substratum
Percentage of component in the map unit: About 6 percent
Landform: Drainageways, swales, hills
Hillslope position: Backslopes, toeslopes, footslopes
Geomorphic position: Interfluves, side slopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngersuul soils
Percentage of component in the map unit: About 4 percent
Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Stream terraces, marshes, backswamps, valley floors, swamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Mesei soils
Percentage of component in the map unit: About 2 percent
Landform: Backswamps, stream terraces, swamps, valley floors, marshes
Geomorphic position: Treads
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 25 centimeters (10 inches)
Total subsidence: About 102 centimeters (40 inches)

606—Aimeliik silt loam, bedded tuff substratum, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 153 meters (3 to 502 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik, bedded tuff substratum, and similar soils—90 percent
Minor components—10 percent

Characteristics of Aimeliik silt loam, bedded tuff substratum

Landform: Hills
Hillslope position: Summits, backslopes, shoulders, toeslopes, footslopes
Geomorphic position: Crests, interfluves, side slopes, head slopes, nose slopes, base slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 17.3 centimeters (6.8 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 83 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 4 centimeters (0 to 2 inches); slightly decomposed plant material
A—4 to 8 centimeters (2 to 3 inches); silt loam
Bto—8 to 103 centimeters (3 to 41 inches); silty clay loam
CBt—103 to 200 centimeters (41 to 79 inches); silty clay

Minor components

Oxyaquic Dystrudepts, bedded tuff substratum
Percentage of component in the map unit: About 4 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, footslopes, backslopes
Geomorphic position: Side slopes, interfluves
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, flood plains, levees, valley floors

Geomorphic position: Treads, risers
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

607—Aimeliik silt loam, bedded tuff substratum, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 206 meters (3 to 676 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik, bedded tuff substratum, and similar soils—90 percent
Minor components—10 percent

Characteristics of Aimeliik silt loam, bedded tuff substratum

Landform: Hills
Hillslope position: Summits, footslopes, toeslopes, shoulders, backslopes
Geomorphic position: Crests, interfluves, side slopes, nose slopes, base slopes, head slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 25 centimeters (4 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 17.5 centimeters (6.9 inches); moderate
Shrink-swell potential: About 6 percent (high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia*

chloraxantha (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
A—3 to 18 centimeters (1 to 7 inches); silt loam
Bto—18 to 124 centimeters (7 to 49 inches); silty clay loam
CBt—124 to 200 centimeters (49 to 79 inches); silty clay loam

Minor components

Oxyaquic Dystrudepts, bedded tuff substratum
Percentage of component in the map unit: About 4 percent
Landform: Drainageways, swales, hills
Hillslope position: Footslopes, toeslopes, backslopes
Geomorphic position: Side slopes, interfluves
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Marshes, stream terraces, swamps, valley floors, backswamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Valley floors, backswamps, flood plains, levees
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

608—Aimeliik silt loam, bedded tuff substratum, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 192 meters (3 to 630 feet)
Landscape: Volcanic islands

Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik, bedded tuff substratum, and similar soils—90 percent
Minor components—10 percent

Characteristics of Aimeliik silt loam, bedded tuff substratum

Landform: Hills
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Head slopes, base slopes, side slopes, crests, nose slopes, interfluves
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 25 centimeters (4 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.4 centimeters (7.2 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
AB—3 to 11 centimeters (1 to 4 inches); silt loam
Bto—11 to 62 centimeters (4 to 24 inches); silty clay loam
CBt—62 to 200 centimeters (24 to 79 inches); silty clay

Minor components

Oxyaquic Dystrudepts, bedded tuff substratum
Percentage of component in the map unit: About 4 percent
Landform: Drainageways, swales, hills
Hillslope position: Footslopes, toeslopes, backslopes
Geomorphic position: Side slopes, interfluves
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Valley floors, levees, flood plains, backswamps
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Valley floors, swamps, stream terraces, marshes, backswamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

609—Aimeliik silt loam, bedded tuff substratum, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 205 meters (3 to 673 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik, bedded tuff substratum, and similar soils—90 percent
Minor components—10 percent

Characteristics of Aimeliik silty clay loam, bedded tuff substratum

Landform: Hills
Hillslope position: Summits, toeslopes, footslopes, shoulders, backslopes
Geomorphic position: Interfluves, side slopes, base slopes, nose slopes, head slopes, crests
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 25 centimeters (4 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.1 centimeters (7.1 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)

Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 5 centimeters (0 to 2 inches); slightly decomposed plant material
A—5 to 21 centimeters (2 to 8 inches); silt loam
Bto—21 to 89 centimeters (8 to 35 inches); silty clay
C—89 to 200 centimeters (35 to 79 inches); silty clay loam

Minor components

Oxyaquic Dystrudepts, bedded tuff substratum
Percentage of component in the map unit: About 4 percent
Landform: Drainageways, swales, hills
Hillslope position: Footslopes, toeslopes, backslopes
Geomorphic position: Interfluves, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngersuul soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Marshes, valley floors, swamps, stream terraces, backswamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

610—Aimeliik-Ollei complex, 20 to 55 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 2 to 144 meters (7 to 472 feet)

Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—45 percent
Ollei and similar soils—30 percent
Minor components—25 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Shoulders, summits, footslopes, toeslopes, backslopes
Geomorphic position: Crests, side slopes, base slopes, nose slopes, head slopes, interfluves
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 20 to 50 percent
Slope shape (down/across): Linear/linear
Percentage of the surface covered by rock fragments: About 5 percent by angular gravel
Depth class: Very deep
Depth to a restrictive feature: 10 to 30 centimeters (4 to 12 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 17.4 centimeters (6.8 inches); moderate
Shrink-swell potential: About 6 percent (high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oe—0 to 7 centimeters (0 to 3 inches); slightly decomposed plant material
A—7 to 27 centimeters (3 to 11 inches); silt loam
Bto—27 to 125 centimeters (11 to 49 inches); silty clay loam
C—125 to 200 centimeters (49 to 79 inches); silty clay

Characteristics of the Ollei soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests

Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 30 to 55 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 15 to 50 centimeters (6 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 3.3 centimeters (1.3 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 3 percent (low)
Aluminum saturation in the subsoil: About 27 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile
Oe—0 to 5 centimeters (0 to 2 inches); very gravelly moderately decomposed plant material
A—5 to 15 centimeters (2 to 6 inches); very gravelly highly organic silt loam
AB—15 to 33 centimeters (6 to 13 inches); very gravelly silty clay loam
R—33 to 58 centimeters (13 to 23 inches); bedrock

Minor components

Nekken soils
Percentage of component in the map unit: About 13 percent
Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Drainage class: Well drained

Rock outcrop
Percentage of component in the map unit: About 7 percent
Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 30 to 150 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Dechel soils
Percentage of component in the map unit: About 5 percent
Landform: Backswamps, valley floors, swamps, marshes, stream terraces
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

611—Aimeliik-Ollei complex, 40 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 155 meters (3 to 509 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aimeliik and similar soils—40 percent
Ollei and similar soils—35 percent
Minor components—25 percent

Characteristics of the Aimeliik soil

Landform: Hills
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Base slopes, side slopes, interfluves, crests, nose slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Percentage of the surface covered by rock fragments: About 5 percent by angular gravel
Depth class: Very deep
Depth to a restrictive feature: 10 to 25 centimeters (4 to 10 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.2 centimeters (7.2 inches); moderate
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 11 percent (low)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Alphitonia carolinensis (Elebiob), *Atuna corymbosa* (Bkau), *Campnosperma brevipetiolata* (Kelelacharm), *Fagraea ksid* (Ksid), *Finschia chloraxantha* (Omail), *Garcinia matudai* (Tilol), *Garcinia matudai* (Tilol), *Manilkara udoid* (Udoid), *Pleome multiflora* (Oredakl), *Pouteria obovata* (Elangel), *Rhus taitensis* (Ueches)

Hydrologic properties

Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile

Oe—0 to 4 centimeters (0 to 2 inches); moderately decomposed plant material
A—4 to 13 centimeters (2 to 5 inches); silt loam
Bto—13 to 71 centimeters (5 to 28 inches); silty clay loam
C—71 to 200 centimeters (28 to 79 inches); silty clay

Characteristics of the Ollei soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 40 to 75 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 10 to 50 centimeters (4 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 3.7 centimeters (1.5 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 3 percent (low)
Aluminum saturation in the subsoil: About 50 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties

Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile

Oi—0 to 4 centimeters (0 to 2 inches); very gravelly slightly decomposed plant material
A—4 to 18 centimeters (2 to 7 inches); very gravelly highly organic silt loam
BC—18 to 38 centimeters (7 to 15 inches); very flaggy silty clay loam
R—38 to 63 centimeters (15 to 25 inches); bedrock

Minor components

Nekken soils
Percentage of component in the map unit: About 13 percent

Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Crests, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Drainage class: Well drained

Rock outcrop
Percentage of component in the map unit: About 7 percent
Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Dechel soils
Percentage of component in the map unit: About 5 percent
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

612—Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 4 to 179 meters (13 to 587 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Babelthuap and similar soils—55 percent
Ngardmau and similar soils—25 percent
Typic Udorthents and similar soils—15 percent
Minor components—5 percent

Characteristics of the Babelthuap soil

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex

Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 16.6 centimeters (6.5 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 57 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 7 centimeters (0 to 3 inches); gravelly silt loam
Bto1—7 to 24 centimeters (3 to 9 inches); silty clay loam
Bto2—24 to 61 centimeters (9 to 24 inches); silty clay
C—61 to 200 centimeters (24 to 79 inches); silty clay

Characteristics of the Ngardmau soil

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes, shoulders, summits
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.6 centimeters (7.3 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 79 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained

Hydrologic soil group: C

Typical profile
Ac—0 to 4 centimeters (0 to 2 inches); gravelly silt loam
Bo—4 to 29 centimeters (2 to 11 inches); gravelly silty clay loam
C—29 to 200 centimeters (11 to 79 inches); silty clay

Characteristics of Typic Udorthents

Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Backslopes, shoulders, summits
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.5 centimeters (7.7 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 1 centimeter (0.0 to 0.4 inch); gravelly silt loam
C1—1 to 3 centimeters (0 to 1 inch); gravelly silty clay
C2—3 to 200 centimeters (1 to 79 inches); silty clay

Minor components

Palau soils
Percentage of component in the map unit: About 3 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Footslopes, summits, shoulders, toeslopes, backslopes
Geomorphic position: Head slopes, nose slopes, base slopes, side slopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Summits, toeslopes, footslopes, shoulders, backslopes
Geomorphic position: Nose slopes, crests, interfluves, side slopes, base slopes, head slopes
Slope: 2 to 6 percent

Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

613—Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 212 meters (3 to 696 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Babelthuap and similar soils—55 percent
Ngardmau and similar soils—25 percent
Typic Udorthents and similar soils—15 percent
Minor components—5 percent

Characteristics of the Babelthuap soil

Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Depth to a restrictive feature: 3 to 15 centimeters (1 to 6 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 15.5 centimeters (6.1 inches); moderate
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 57 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 12 centimeters (0 to 5 inches); gravelly silt loam

Bto—12 to 85 centimeters (5 to 33 inches); silty clay loam
CBt—85 to 200 centimeters (33 to 79 inches); silty clay

Characteristics of the Ngardmau soil

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes, summits, shoulders
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.1 centimeters (7.1 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 79 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 4 centimeters (0 to 2 inches); silt loam
Bo—4 to 45 centimeters (2 to 18 inches); gravelly silty clay loam
C—45 to 200 centimeters (18 to 79 inches); loam

Characteristics of Typic Udorthents

Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Backslopes, shoulders, summits
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.5 centimeters (7.7 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 1 centimeter (0.0 to 0.4 inch); gravelly silt loam
C1—1 to 3 centimeters (0 to 1 inch); gravelly silty clay
C2—3 to 200 centimeters (1 to 79 inches); silty clay

Minor components

Palau soils
Percentage of component in the map unit: About 3 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Toeslopes, footslopes, backslopes, shoulders, summits
Geomorphic position: Base slopes, head slopes, nose slopes, side slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Summits, toeslopes, footslopes, shoulders, backslopes
Geomorphic position: Interfluves, side slopes, base slopes, crests, nose slopes, head slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

614—Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 4 to 234 meters (13 to 768 feet)
Landscape: Volcanic islands (figs. 10 and 11)
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Babelthuap and similar soils—45 percent
Ngardmau and similar soils—30 percent
Typic Udorthents and similar soils—20 percent
Minor components—5 percent

Characteristics of the Babelthuap soil

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes

Figure 10.—An area of Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes, on degraded fern land on a volcanic landscape in southeast Airai State on Babeldaob Island.

Figure 11.—Typical fern-land vegetatiion in an area of Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes. These ferns (*Gleichenia linearis* or *Dicranopteris linearis*) can tolerate the very low fertility and high soluble aluminum content of the soils. The insectivorous pitcher plant (*Nepenthes mirabilis*) also is an indicator of very low soil fertility.

Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Depth to a restrictive feature: 2 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 14.9 centimeters (5.9 inches); low
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 57 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
ABc—0 to 2 centimeters (0.0 to 0.8 inch); gravelly silt loam
Bto—2 to 92 centimeters (1 to 36 inches); silty clay
C—92 to 200 centimeters (36 to 79 inches); silty clay

Characteristics of the Ngardmau soil

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, shoulders, backslopes, summits
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.6 centimeters (7.3 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 79 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None

Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 4 centimeters (0 to 2 inches); gravelly silt loam
Bo—4 to 29 centimeters (2 to 11 inches); silty clay loam
C—29 to 200 centimeters (11 to 79 inches); silty clay

Characteristics of Typic Udorthents

Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, shoulders, backslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.5 centimeters (7.7 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 1 centimeter (0.0 to 0.4 inch); gravelly silt loam
C1—1 to 3 centimeters (0 to 1 inch); gravelly silty clay
C2—3 to 200 centimeters (1 to 79 inches); silty clay

Minor components

Palau soils
Percentage of component in the map unit: About 3 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Shoulders, footslopes, toeslopes, summits, backslopes
Geomorphic position: Side slopes, base slopes, head slopes, nose slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Backslopes, summits, shoulders, footslopes, toeslopes

Geomorphic position: Interfluves, side slopes, base slopes, nose slopes, head slopes, crests
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

615—Chia-Insak complex, 0 to 1 percent slopes

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: -1 to 4 meters (-3 to 13 feet)
Landscape: Rock islands, raised coralline platform islands, areas adjacent to atolls, areas of karst
Aspect: No dominant orientation
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Chia and similar soils—65 percent
Insak and similar soils—30 percent
Minor components—5 percent

Characteristics of the Chia soil

Landform: Intertidal zone of tidal marshes, mangrove swamps, salt marshes
Geomorphic position: Talf
Parent material: Organic deposits derived predominantly from decomposing mangrove roots and litter over water-deposited coralline sand and gravel
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 25.4 centimeters (10.0 inches); high
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 98 percent
Maximum initial subsidence: About 75 centimeters (30 inches)
Maximum total subsidence: About 150 centimeters (59 inches)
Potential vegetation: Bruguiera sp., *Lumnitzera* sp., *Rhizophora* sp., *Sonneratia* sp., *Xylocarpus* sp.

Hydrologic properties
Ponding: None
Flooding: Very frequent
Runoff class: High
Depth to a seasonal high water table: About 0 to 15 centimeters (0 to 6 inches)
Drainage class: Very poorly drained
Hydrologic soil group: D

Typical profile
Oi1—0 to 51 centimeters (0 to 20 inches); peat
Oi2—51 to 74 centimeters (20 to 29 inches); peat
2C1—74 to 94 centimeters (29 to 37 inches); gravelly loamy sand

2C2—94 to 200 centimeters (37 to 79 inches); very gravelly loamy sand

Characteristics of the Insak soil

Landform: Brackish waters adjacent to shores, tidal marshes, mangrove swamps, salt marshes
Geomorphic position: Talf
Parent material: Organic material and sand derived from coral limestone
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth class: Moderately deep
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 6.6 centimeters (2.6 inches); very low
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 100 percent
Maximum initial subsidence: About 10 centimeters (4 inches)
Maximum total subsidence: About 20 centimeters (8 inches)
Potential vegetation: *Bruguiera* sp., *Lumnitzera* sp., *Rhizophora* sp., *Sonneratia* sp., *Xylocarpus* sp.

Hydrologic properties
Ponding: None
Flooding: Very frequent
Runoff class: High
Depth to a seasonal high water table: 0 centimeters (0 inches)
Drainage class: Very poorly drained
Hydrologic soil group: A/D

Typical profile
A—0 to 8 centimeters (0 to 3 inches); peaty loamy sand
AC—8 to 18 centimeters (3 to 7 inches); mucky loamy sand
C1—18 to 46 centimeters (7 to 18 inches); mucky loamy sand
C2—46 to 74 centimeters (18 to 29 inches); gravelly loamy sand
R—74 to 99 centimeters (29 to 39 inches); bedrock

Minor components

Ngedebus soils
Percentage of component in the map unit: About 2 percent
Landform: Back-barrier beaches, beach terraces, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Risers, treads
Slope: 0 to 3 percent
Slope shape (down/across): Linear/convex
Drainage class: Somewhat excessively drained
Flooding: Occasional

Peleliu soils
Percentage of component in the map unit: About 2 percent
Landform: Karrens, karst cones, karst towers, karst valleys
Hillslope position: Shoulders, backslopes, summits, footslopes
Geomorphic position: Side slopes, head slopes, interfluves
Slope: 1 to 20 percent
Slope shape (down/across): Linear/convex

Depth to a restrictive feature: 20 to 50 centimeters (8 to 20 inches) to lithic bedrock
Drainage class: Well drained

Odesangel soils
Percentage of component in the map unit: About 1 percent
Landform: Scalped areas, depressions, atolls, anthropogenic fens, solution sinkholes, swamps
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 35 centimeters (14 inches)
Total subsidence: About 75 centimeters (30 inches)

616—Dechel silty clay, 0 to 2 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 67 meters (0 to 220 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Dechel and similar soils—85 percent
Minor components—15 percent

Characteristics of the Dechel soil

Landform: Valley floors, swamps, stream terraces, backswamps, marshes (fig. 12)
Geomorphic position: Treads
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 50.6 centimeters (19.9 inches); very high
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 42 percent (moderate)
Aluminum saturation in the subsoil: About 42 percent (moderate)
Maximum initial subsidence: About 5 centimeters (2 inches)
Maximum total subsidence: About 20 centimeters (8 inches)
Potential vegetation: Barringtonia racemosa (Koranges), *Barringtonia racemosa* (Koranges), *Callophyllum pelewense* (Chesemochel), *Colocasia esculenta* (kukau, wetland taro), *Crudia cynometroides*, *Crytosperma chammissions* (brak, wetland taro), *Dolichandrone* (Rriu), *Donax canneformis* (Temring), *Hanguana malayana* (Ocheis), *Hibiscus tiliaceous* (Cheremal), *Horsfieldia amklaal* (emeklachel, eumail), *Inocarpus fagifer* (Keam), *Pandanus kanehirae* (Buuk), *Samadera indica* (Eskeam), *Stemmonorus ammui* (Ammui)

Figure 12.—An area of Dechel silty clay, 0 to 2 percent slopes, on bottom land. This soil is relatively fertile and is well suited to wetland taro. It is one of the principal agricultural soils in Palau. The hillsides in the background are mapped as Palau silty clay loam, 6 to 12 percent slopes (map unit 636). This landscape is located in Airai State, Babeldaob Island.

Hydrologic properties

Ponding: Frequent
Flooding: Frequent
Runoff class: Negligible
Depth to a seasonal high water table: About 0 to 25 centimeters (0 to 10 inches)
Drainage class: Very poorly drained
Hydrologic soil group: C/D

Typical profile

A—0 to 6 centimeters (0 to 2 inches); silty clay
2Bg—6 to 18 centimeters (2 to 7 inches); clay
3Cg—18 to 200 centimeters (7 to 79 inches); clay

Minor components

Mesei soils

Percentage of component in the map unit: About 8 percent
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 75 centimeters (30 inches)
Total subsidence: About 150 centimeters (59 inches)

Ngersuul soils
Percentage of component in the map unit: About 4 percent
Landform: Flood plains, backswamps, valley floors, levees
Geomorphic position: Treads, risers
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Hydraquentic Humaquepts
Percentage of component in the map unit: About 2 percent
Landform: Valley floors
Geomorphic position: Dips
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Naniak soils
Percentage of component in the map unit: About 1 percent
Landform: Areas of brackish water adjacent to shores, salt marshes, mangrove swamps, tidal marshes
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Very frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

617—Ilachetomel-Naniak complex, 0 to 1 slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: -1 to 4 meters (-3 to 13 feet)
Landscape: Adjacent to volcanic islands (fig. 13)
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ilachetomel and similar soils—75 percent
Naniak and similar soils—20 percent
Minor components—5 percent

Characteristics of the Ilachetomel soil

Landform: Intertidal zone of mangrove swamps, salt marshes, tidal marshes
Geomorphic position: Talf
Parent material: Organic deposits derived predominantly from decomposing mangrove roots and litter
Slope: 0 to 1 percent

Figure 13.—Mangrove swamps occur in coastal intertidal areas adjacent to volcanic uplands, marine terraces, and limestone landscapes. Wet mineral soils adjacent to the shore, and organic soils extend farther into deeper water. Chia-Insak complex, 0 to 1 percent slopes (map unit 615), and Ilachetomel-Naniak complex, 0 to 1 percent slopes (map unit 617), are mapped in this environment.

Slope shape (down/across): Linear/linear
Depth class: Very deep
Available water capacity: About 45.0 centimeters (17.7 inches); very high
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 1 percent (low)
Aluminum saturation in the subsoil: About 1 percent (low)
Maximum initial subsidence: About 100 centimeters (39 inches)
Maximum total subsidence: About 200 centimeters (79 inches)
Potential vegetation: Acrostichum aureum, *Avicennia marina*, *Bruguiera gymnorrhiza* (kadeges), *Ceriops tagal*, *Dalbergia candenatensis*, *Derris trifoliata*, *Lumnitzera littorea* (ngemoel), *Nephrolepis acutifolia*, *Nypa fruticans*, *Rhizophora apiculata* (bngaol), *Rhizophora mucronata* (tebechel), *Scyphiphora hydrophyllacea*, *Sonneratia alba* (urur), *Xylocarpus granatum* (meduulokebong)

Hydrologic properties
Ponding: None
Flooding: Very frequent
Runoff class: High
Depth to a seasonal high water table: About 0 to 15 centimeters (0 to 6 inches)
Drainage class: Very poorly drained
Hydrologic soil group: D

Typical profile
Oi1—0 to 41 centimeters (0 to 16 inches); peat

Oi2—41 to 200 centimeters (16 to 79 inches); peat

Characteristics of the Naniak soil

Landform: Areas of brackish water adjacent to shores, salt marshes, mangrove swamps, tidal marshes
Geomorphic position: Dips
Parent material: Organic deposits and alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 28.6 centimeters (11.2 inches); high
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 14 percent (low)
Aluminum saturation in the subsoil: About 54 percent (moderate)
Maximum initial subsidence: About 10 centimeters (4 inches)
Maximum total subsidence: About 20 centimeters (8 inches)
Potential vegetation: Acrostichum aureum, *Avicennia marina*, *Bruguiera gymnorrhiza* (kadeges), *Ceriops tagal*, *Dalbergia candenatensis*, *Derris trifoliata*, *Lumnitzera littorea* (ngemoel), *Nephrolepis acutifolia*, *Nypa fruticans*, *Rhizophora apiculata* (bngaol), *Rhizophora mucronata* (tebechel), *Scyphiphora hydrophyllacea*, *Sonneratia alba* (urur), *Xylocarpus granatum* (meduulokebong)

Hydrologic properties
Ponding: Frequent
Flooding: Very frequent
Runoff class: Negligible
Depth to a seasonal high water table: About 0 to 20 centimeters (0 to 8 inches)
Drainage class: Very poorly drained
Hydrologic soil group: B/D

Typical profile
A—0 to 30 centimeters (0 to 12 inches); mucky silt loam
Cg1—30 to 61 centimeters (12 to 24 inches); mucky loam
2Cg2—61 to 200 centimeters (24 to 79 inches); gravelly loam

Minor components

Dechel soils
Percentage of component in the map unit: About 2 percent
Landform: Swamps, marshes, backswamps, valley floors, stream terraces
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 5 centimeters (2 inches)
Total subsidence: About 20 centimeters (8 inches)

Mesei soils
Percentage of component in the map unit: About 2 percent
Landform: Marshes, backswamps, valley floors, swamps, stream terraces
Geomorphic position: Treads

Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 75 centimeters (30 inches)
Total subsidence: About 150 centimeters (59 inches)

Chia soils
Percentage of component in the map unit: About 1 percent
Landform: Intertidal zone of tidal marshes, mangrove swamps, salt marshes
Geomorphic position: Talf
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Very frequent
Initial subsidence: About 50 centimeters (20 inches)
Total subsidence: About 100 centimeters (39 inches)

618—Mesei-Dechel complex, 0 to 2 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 71 meters (0 to 233 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Mesei and similar soils—55 percent
Dechel and similar soils—30 percent
Minor components—15 percent

Characteristics of the Mesei soil

Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Parent material: Organic material over alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 34.1 centimeters (13.4 inches); very high
Shrink-swell potential: About 1 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Aluminum saturation in the subsoil: About 27 percent (moderate)
Maximum initial subsidence: About 75 centimeters (30 inches)
Maximum total subsidence: About 150 centimeters (59 inches)
Potential vegetation: Barringtonia racemosa (Koranges), *Barringtonia racemosa* (Koranges), *Callophyllum pelewense* (Chesemochel), *Colocasia esculenta* (kukau, wetland taro), *Crudia cynometroides*, *Crytosperma chammissions* (brak, wetland

taro), *Dolichandrone* (Rriu), *Donax canneformis* (Temring), *Hanguana malayana* (Ocheis), *Hibiscus tiliaceous* (Cheremal), *Horsfieldia amklaal* (emeklachel, eumail), *Inocarpus fagifer* (Keam), *Pandanus kanehirae* (Buuk), *Samadera indica* (Eskeam), *Stemmonorus ammui* (Ammui)

Hydrologic properties
Ponding: Frequent
Flooding: Frequent
Runoff class: Negligible
Depth to a seasonal high water table: About 0 to 15 centimeters (0 to 6 inches)
Drainage class: Very poorly drained
Hydrologic soil group: D

Typical profile
Oa1—0 to 21 centimeters (0 to 8 inches); muck
Oa2—21 to 77 centimeters (8 to 30 inches); muck
2Cg—77 to 200 centimeters (30 to 79 inches); silty clay loam

Characteristics of the Dechel soil

Landform: Valley floors, swamps, backswamps, marshes, stream terraces
Geomorphic position: Treads
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 50.6 centimeters (19.9 inches); very high
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 42 percent (moderate)
Aluminum saturation in the subsoil: About 42 percent (moderate)
Maximum initial subsidence: About 5 centimeters (2 inches)
Maximum total subsidence: About 15 centimeters (6 inches)
Potential vegetation: Barringtonia racemosa (Koranges), *Barringtonia racemosa* (Koranges), *Callophyllum pelewense* (Chesemochel), *Colocasia esculenta* (kukau, wetland taro), *Crudia cynometroides*, *Crytosperma chammissions* (brak, wetland taro), *Dolichandrone* (Rriu), *Donax canneformis* (Temring), *Hanguana malayana* (Ocheis), *Hibiscus tiliaceous* (Cheremal), *Horsfieldia amklaal* (emeklachel, eumail), *Inocarpus fagifer* (Keam), *Pandanus kanehirae* (Buuk), *Samadera indica* (Eskeam), *Stemmonorus ammui* (Ammui)

Hydrologic properties
Ponding: Frequent
Flooding: Frequent
Runoff class: Negligible
Depth to a seasonal high water table: About 0 to 25 centimeters (0 to 10 inches)
Drainage class: Very poorly drained
Hydrologic soil group: C/D

Typical profile
A—0 to 7 centimeters (0 to 3 inches); silt loam
2Bg—7 to 20 centimeters (3 to 8 inches); silty clay loam
3Cg—20 to 200 centimeters (8 to 79 inches); silty clay loam

Minor components

Ngersuul soils
Percentage of component in the map unit: About 10 percent
Landform: Levees, flood plains, backswamps, valley floors
Geomorphic position: Risers, treads
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Drainage class: Somewhat poorly drained
Flooding: Frequent

Naniak soils
Percentage of component in the map unit: About 5 percent
Landform: Areas of brackish water adjacent to shores, salt marshes, mangrove swamps, tidal marshes
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Very frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

619—Nekken-Ollei complex, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 175 meters (3 to 574 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Nekken and similar soils—60 percent
Ollei and similar soils—30 percent
Minor components—10 percent

Characteristics of the Nekken soil

Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 5 percent by angular cobbles
Depth class: Moderately deep
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high

Available water capacity: About 9.6 centimeters (3.8 inches); low
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 5 percent (low)
Aluminum saturation in the subsoil: About 58 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
A—3 to 20 centimeters (1 to 8 inches); silt loam
Bt—20 to 46 centimeters (8 to 18 inches); very cobbly silty clay loam
C—46 to 56 centimeters (18 to 22 inches); very gravelly silty clay loam
R—56 to 81 centimeters (22 to 32 inches); bedrock

Characteristics of the Ollei soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 12 to 30 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 15 to 50 centimeters (6 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 1.9 centimeters (0.8 inch); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 27 percent (moderate)
Aluminum saturation in the subsoil: About 57 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained

Hydrologic soil group: D

Typical profile

Oi—0 to 4 centimeters (0 to 2 inches); slightly decomposed plant material
A—4 to 8 centimeters (2 to 3 inches); highly organic silt loam
Bw—8 to 14 centimeters (3 to 6 inches); very gravelly silt loam
CB—14 to 21 centimeters (6 to 8 inches); extremely flaggy silt loam
R—21 to 46 centimeters (8 to 18 inches); bedrock

Minor components

Aimeliik soils
Percentage of component in the map unit: About 5 percent
Landform: Hills
Hillslope position: Summits, backslopes, footslopes, shoulders, toeslopes
Geomorphic position: Nose slopes, base slopes, side slopes, interfluves, crests, head slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Rock outcrop
Percentage of component in the map unit: About 3 percent
Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 30 to 150 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Ngatpang soils
Percentage of component in the map unit: About 2 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, toeslopes, summits, backslopes, shoulders
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

620—Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 20 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 3 to 233 meters (10 to 764 feet)
Landscape: Volcanic islands (fig. 14)
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngardmau and similar soils—50 percent
Babelthuap and similar soils—30 percent
Typic Udorthents and similar soils—15 percent
Minor components—5 percent

Figure 14.—Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 20 to 50 percent slopes, is characterized by steep slopes that are sparsely vegetated or barren. This site is in Melekeok State, Babeldaob Island.

Characteristics of the Ngardmau soil

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes, summits, shoulders
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 20 to 50 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.1 centimeters (7.5 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile

BAc—0 to 4 centimeters (0 to 2 inches); silty clay loam
Bo—4 to 12 centimeters (2 to 5 inches); silty clay
BC—12 to 43 centimeters (5 to 17 inches); silty clay
C—43 to 200 centimeters (17 to 79 inches); silty clay

Characteristics of the Babelthuap soil

Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 20 to 50 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Depth to a restrictive feature: 4 to 10 centimeters (2 to 4 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 18.6 centimeters (7.3 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 71 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties

Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile

BAc—0 to 4 centimeters (0 to 2 inches); gravelly silty clay loam
Bto—4 to 20 centimeters (2 to 8 inches); silty clay
CBt—20 to 39 centimeters (8 to 15 inches); silty clay
C—39 to 200 centimeters (15 to 79 inches); silty clay

Characteristics of Typic Udorthents

Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, backslopes, shoulders
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 20 to 50 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high

Available water capacity: About 19.5 centimeters (7.7 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 1 centimeter (0.0 to 0.4 inch); gravelly silt loam
C1—1 to 3 centimeters (0 to 1 inch); gravelly silty clay
C2—3 to 200 centimeters (1 to 79 inches); silty clay

Minor components

Palau soils
Percentage of component in the map unit: About 3 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Summits, toeslopes, footslopes, shoulders, backslopes
Geomorphic position: Nose slopes, base slopes, side slopes, head slopes
Slope: 20 to 50 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Footslopes, shoulders, summits, backslopes, toeslopes
Geomorphic position: Crests, side slopes, base slopes, head slopes, nose slopes, interfluves
Slope: 20 to 50 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

621—Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 3 to 234 meters (10 to 768 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngardmau and similar soils—50 percent
Babelthuap and similar soils—30 percent

Typic Udorthents and similar soils—15 percent
Minor components—5 percent

Characteristics of the Ngardmau soil

Landform: Erosional crests and ridges on hills
Hillslope position: Summits, shoulders, backslopes, toeslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.1 centimeters (7.5 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
BAc—0 to 4 centimeters (0 to 2 inches); gravelly silty clay loam
Bo—4 to 12 centimeters (2 to 5 inches); silty clay
BC—12 to 43 centimeters (5 to 17 inches); silty clay
C—43 to 200 centimeters (17 to 79 inches); silty clay

Characteristics of Babelthuap soils

Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Depth to a restrictive feature: 5 to 10 centimeters (2 to 4 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 16.7 centimeters (6.6 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High

Aluminum saturation in the topsoil: About 57 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Ectrosia lepornia, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Nepenthes mirabilis* (Meliik), *Paspalum orbiculare*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 6 centimeters (0 to 2 inches); gravelly silt loam
Bto—6 to 58 centimeters (2 to 23 inches); silty clay
C—58 to 200 centimeters (23 to 79 inches); silty clay loam

Characteristics of Typic Udorthents

Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Shoulders, backslopes, summits
Geomorphic position: Side slopes, crests
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.5 centimeters (7.7 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 1 centimeter (0.0 to 0.4 inch); gravelly silt loam
C1—1 to 3 centimeters (0 to 1 inch); gravelly silty clay
C2—3 to 200 centimeters (1 to 79 inches); silty clay

Minor components

Palau soils
Percentage of component in the map unit: About 3 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Footslopes, shoulders, toeslopes, summits, backslopes
Geomorphic position: Nose slopes, head slopes, base slopes, side slopes
Slope: 50 to 75 percent

Slope shape (down/across): Linear/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Backslopes, summits, shoulders, footslopes, toeslopes
Geomorphic position: Interfluves, crests, side slopes, base slopes, nose slopes, head slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

622—Oxic Dystrudepts, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 101 meters (3 to 331 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Oxic Dystrudepts and similar soils—90 percent
Minor components—10 percent

Characteristics of Oxic Dystrudepts

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 2 to 6 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 15 percent by angular gravel
Depth class: Very deep
Most limiting permeability (Ksat): Less than 0.0036 cm/hr (less than 0.0014 in/hr); very low
Available water capacity: About 36.9 centimeters (14.5 inches); very high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 63 percent (high)
Aluminum saturation in the subsoil: About 63 percent (high)
Potential vegetation: *Cyperaceae* (Sedge), *Ectrosia lepornia*, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Melestoma malabrathicum*, *Nepenthes mirabilis* (Meliik), *Pandanus tectorius* (Ongor), *Paspalum orbiculare*, *Poaceae* (grasses)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high

Depth to a seasonal high water table: About 35 to 45 centimeters (14 to 18 inches)
Drainage class: Moderately well drained
Hydrologic soil group: D

Typical profile
A—0 to 5 centimeters (0 to 2 inches); silt loam
Bo—5 to 15 centimeters (2 to 6 inches); very gravelly silty clay loam
C—15 to 200 centimeters (6 to 79 inches); clay

Minor components

Ngatpang soils
Percentage of component in the map unit: About 7 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, toeslopes, backslopes, shoulders, footslopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Tabecheding soils
Percentage of component in the map unit: About 3 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

623—Oxic Dystrudepts, 12 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 6 to 121 meters (20 to 397 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Oxic Dystrudepts and similar soils—90 percent
Minor components—10 percent

Characteristics of Oxic Dystrudepts

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 12 to 50 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 15 percent by angular gravel
Depth class: Very deep
Most limiting permeability (Ksat): Less than 0.0036 cm/hr (less than 0.0014 in/hr); very low

Available water capacity: About 37.3 centimeters (14.7 inches); very high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 63 percent (high)
Aluminum saturation in the subsoil: About 63 percent (high)
Potential vegetation: Cyperaceae (Sedge), *Ectrosia lepornia*, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Melestoma malabrathicum*, *Nepenthes mirabilis* (Meliik), *Pandanus tectorius* (Ongor), *Paspalum orbiculare*, *Poaceae* (grasses)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 35 to 45 centimeters (14 to 18 inches)
Drainage class: Moderately well drained
Hydrologic soil group: D

Typical profile
A—0 to 2 centimeters (0.0 to 0.8 inch); silty clay loam
Bo—2 to 13 centimeters (1 to 5 inches); silty clay
C1—13 to 43 centimeters (5 to 17 inches); clay
C2—43 to 200 centimeters (17 to 79 inches); clay

Minor components

Ngatpang soils
Percentage of component in the map unit: About 7 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Slope: 12 to 50 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Tabecheding soils
Percentage of component in the map unit: About 3 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, footslopes, backslopes, shoulders, summits
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

624—Ngatpang silty clay loam, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 113 meters (3 to 371 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngatpang and similar soils—80 percent
Minor components—20 percent

Characteristics of the Ngatpang soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, toeslopes, shoulders, backslopes, footslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 2 to 6 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 2 percent by subrounded gravel
Depth class: Very deep
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 36.5 centimeters (14.4 inches); very high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 63 percent (high)
Aluminum saturation in the subsoil: About 63 percent (high)
Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 40 to 50 centimeters (16 to 20 inches)
Drainage class: Moderately well drained
Hydrologic soil group: C/D

Typical profile
A—0 to 15 centimeters (0 to 6 inches); silty clay loam
Bo1—15 to 48 centimeters (6 to 19 inches); silty clay
Bo2—48 to 114 centimeters (19 to 45 inches); clay
C—114 to 200 centimeters (45 to 79 inches); clay

Minor components

Tabecheding soils
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, toeslopes, footslopes, backslopes, shoulders
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

Oxic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills

Hillslope position: Footslopes, backslopes, toeslopes, summits, shoulders
Slope: 2 to 6 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Aimeliik soils
Percentage of component in the map unit: About 3 percent
Landform: Hills
Hillslope position: Shoulders, backslopes, summits, footslopes, toeslopes
Geomorphic position: Crests, interfluves, side slopes, base slopes, nose slopes, head slopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Palau soils
Percentage of component in the map unit: About 2 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Summits, shoulders, footslopes, toeslopes, backslopes
Geomorphic position: Head slopes, side slopes, base slopes, nose slopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

625—Ngatpang silty clay loam, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 5 to 93 meters (16 to 305 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngatpang and similar soils—80 percent
Minor components—20 percent

Characteristics of the Ngatpang soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Depth class: Very deep
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 36.7 centimeters (14.5 inches); very high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 63 percent (high)
Aluminum saturation in the subsoil: About 63 percent (high)

Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 40 to 50 centimeters (16 to 20 inches)
Drainage class: Moderately well drained
Hydrologic soil group: C/D

Typical profile
A1—0 to 6 centimeters (0 to 2 inches); silty clay loam
A2—6 to 12 centimeters (2 to 5 inches); gravelly silty clay loam
Bo—12 to 91 centimeters (5 to 36 inches); clay
C—91 to 200 centimeters (36 to 79 inches); silty clay

Minor components

Tabecheding soils
Percentage of component in the map unit: About 8 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

Aimeliik soils
Percentage of component in the map unit: About 5 percent
Landform: Hills
Hillslope position: Summits, shoulders, footslopes, backslopes, toeslopes
Geomorphic position: Nose slopes, interfluves, side slopes, base slopes, crests, head slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Oxic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Lithic Haploperox
Percentage of component in the map unit: About 2 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes

Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

626—Ngatpang silty clay loam, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 91 meters (3 to 299 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngatpang and similar soils—75 percent
Minor components—25 percent

Characteristics of the Ngatpang soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, toeslopes, footslopes, backslopes, shoulders
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Depth class: Very deep
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 36.9 centimeters (14.5 inches); very high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 63 percent (high)
Aluminum saturation in the subsoil: About 63 percent (high)
Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 40 to 50 centimeters (16 to 20 inches)
Drainage class: Moderately well drained
Hydrologic soil group: C/D

Typical profile
A—0 to 13 centimeters (0 to 5 inches); silty clay loam
Bo1—13 to 40 centimeters (5 to 16 inches); silty clay
Bo2—40 to 126 centimeters (16 to 50 inches); clay
C—126 to 200 centimeters (50 to 79 inches); clay

Minor components

Tabecheding soils
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Backslopes, shoulders, summits, toeslopes, footslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

Oxic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, shoulders, footslopes, summits, backslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Aimeliik soils
Percentage of component in the map unit: About 5 percent
Landform: Hills
Hillslope position: Footslopes, backslopes, summits, shoulders, toeslopes
Geomorphic position: Crests, interfluves, side slopes, base slopes, nose slopes, head slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Lithic Haploperox
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Shoulders, summits, toeslopes, footslopes, backslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

627—Ngatpang silty clay loam, well drained, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 6 to 75 meters (20 to 246 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngatpang and similar soils—80 percent
Minor components—20 percent

Characteristics of the Ngatpang soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, footslopes, backslopes, shoulders, toeslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 30 to 50 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 2 percent by subrounded gravel
Depth class: Very deep
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 36.9 centimeters (14.5 inches); very high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 63 percent (high)
Aluminum saturation in the subsoil: About 63 percent (high)
Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 40 to 50 centimeters (16 to 20 inches)
Drainage class: Well drained
Hydrologic soil group: C/D

Typical profile
A—0 to 10 centimeters (0 to 4 inches); silty clay loam
Bo—10 to 85 centimeters (4 to 33 inches); silty clay
BC—85 to 120 centimeters (33 to 47 inches); silty clay
CB—120 to 200 centimeters (47 to 79 inches); clay

Minor components

Tabecheding soils
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Backslopes, shoulders, summits, toeslopes, footslopes
Slope: 20 to 40 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

Lithic Haploperox
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills

Hillslope position: Backslopes, footslopes, toeslopes, summits, shoulders
Slope: 30 to 50 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

Oxic Dystrudepts
Percentage of component in the map unit: About 3 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Slope: 30 to 50 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Shoulders, toeslopes, footslopes, summits, backslopes
Geomorphic position: Crests, interfluves, side slopes, base slopes, nose slopes, head slopes
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

628—Ngedebus highly organic fine sandy loam, 0 to 3 percent slopes

Map unit setting

Major land resource area: 196 (Coral Atolls of Micronesia)
Elevation: -1 to 6 meters (-3 to 20 feet)
Landscape: Limestone islands, barrier islands, atolls, areas of karst
Aspect: No dominant orientation
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngedebus and similar soils—75 percent
Minor components—25 percent

Characteristics of the Ngedebus soil

Landform: Beach terraces, back-barrier beaches, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Parent material: Water- and wind-deposited coralline sandy material
Slope: 0 to 3 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Available water capacity: About 9.2 centimeters (3.6 inches); low

Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 98 percent
Potential vegetation: Bruguiera sp., *Lumnitzera* sp., *Rhizophora* sp., *Sonneratia* sp., *Xylocarpus* sp.

Hydrologic properties
Ponding: None
Flooding: Occasional
Runoff class: Negligible
Depth to a seasonal high water table: About 100 to 150 centimeters (39 to 59 inches)
Drainage class: Somewhat excessively drained
Hydrologic soil group: A

Typical profile
Oi—0 to 1 centimeter (0.0 to 0.4 inch); slightly decomposed plant material
A1—1 to 5 centimeters (0 to 2 inches); highly organic fine sandy loam
A2—5 to 14 centimeters (2 to 6 inches); fine sandy loam
AC—14 to 46 centimeters (6 to 18 inches); fine sand
C—46 to 200 centimeters (18 to 79 inches); fine sand

Minor components

Majuro soils
Percentage of component in the map unit: About 10 percent
Landform: Beach terraces, back-barrier flats, beach ridges, beaches, generally on the oceanside of atolls
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Slope: 0 to 3 percent
Slope shape (down/across): Linear/convex
Drainage class: Somewhat excessively drained
Flooding: Occasional

Typic Udipsamments
Percentage of component in the map unit: About 10 percent
Landform: Back-barrier beaches, beach terraces, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Slope: 0 to 3 percent
Slope shape (down/across): Linear/convex
Drainage class: Somewhat excessively drained
Flooding: Occasional

Odesangel soils
Percentage of component in the map unit: About 3 percent
Landform: Depressions, scalped areas, atolls, anthropogenic fens, solution sinkholes, swamps
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 0 to 20 centimeters (0 to 8 inches) to lithic bedrock
Drainage class: Very poorly drained
Flooding: Frequent

Ponding: Frequent
Initial subsidence: About 30 centimeters (12 inches)
Total subsidence: About 75 centimeters (30 inches)

Beaches
Percentage of component in the map unit: About 2 percent
Landform: Beach terraces, atolls, beaches
Hillslope position: Backslopes
Geomorphic position: Rises, treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/convex
Drainage class: Excessively drained
Flooding: Very frequent

629—Majuro extremely cobbly fine sandy loam, 2 to 6 percent slopes

Map unit setting

Major land resource area: 196 (Coral Atolls of Micronesia)
Elevation: 0 to 7 meters (0 to 23 feet)
Landscape: Barrier islands, atolls, limestone islands, areas of karst
Aspect: No dominant orientation
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Majuro and similar soils—85 percent
Minor components—15 percent

Characteristics of the Majuro soil

Landform: Back-barrier flats, beach terraces, beach ridges, beaches, generally on the oceanside of atolls
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Parent material: Water- and wind-deposited coralline rubble and sandy material
Slope: 2 to 6 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 50 percent by angular gravel and 35 percent by angular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Available water capacity: About 9.5 centimeters (3.7 inches); low
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 98 percent
Potential vegetation: Bruguiera sp., *Lumnitzera* sp., *Rhizophora* sp., *Sonneratia* sp., *Xylocarpus* sp.

Hydrologic properties
Ponding: None
Flooding: Occasional
Runoff class: Negligible
Depth to a seasonal high water table: About 107 centimeters (42 inches)

Drainage class: Somewhat excessively drained
Hydrologic soil group: A

Typical profile
Oi—0 to 2 centimeters (0.0 to 0.8 inch); extremely cobbly slightly decomposed plant material
A1—2 to 5 centimeters (1 to 2 inches); extremely cobbly fine sandy loam
A2—5 to 14 centimeters (2 to 6 inches); extremely cobbly fine sandy loam
AC—14 to 33 centimeters (6 to 13 inches); extremely cobbly fine sand
C—33 to 200 centimeters (13 to 79 inches); extremely cobbly fine sand

Minor components

Ngedebus soils
Percentage of component in the map unit: About 10 percent
Landform: Back-barrier beaches, beach terraces, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Risers, treads
Slope: 0 to 3 percent
Slope shape (down/across): Linear/convex
Drainage class: Somewhat excessively drained
Flooding: Occasional

Odesangel soils
Percentage of component in the map unit: About 3 percent
Landform: Scalped areas, depressions, atolls, anthropogenic fens, solution sinkholes, swamps
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 0 to 20 centimeters (0 to 8 inches) to lithic bedrock
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 50 centimeters (20 inches)
Total subsidence: About 75 centimeters (30 inches)

Beaches
Percentage of component in the map unit: About 2 percent
Landform: Atolls, beach terraces, beaches
Hillslope position: Backslopes
Geomorphic position: Rises, treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/convex
Drainage class: Excessively drained

630—Ngersuul silt loam, 0 to 4 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 80 meters (2 to 262 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ngersuul and similar soils—80 percent
Minor components—20 percent

Characteristics of the Ngersuul soil

Landform: Backswamps, flood plains, levees, valley floors
Geomorphic position: Risers, treads
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Slope: 0 to 4 percent
Slope shape (down/across): Concave/concave
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 37.7 centimeters (14.8 inches); very high
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 14 percent (low)
Aluminum saturation in the subsoil: About 27 percent (moderate)
Potential vegetation: Barringtonia racemosa (Koranges), *Callophyllum pelewense* (Chesemolech), *Campnosperma brevipetiolata* (Kelelacharm), *Colona scabra* (Uchab), *Cynometra ramiflora* (Ketenguit), *Cyrtandra palauensis* (Melkii), *Hibiscus tiliaceos* (Chermall), *Inocarpus fagifer* (Keam), *Marratia/Angiopteris* (Dermarm), *Samadera indica* (Eskeam)

Hydrologic properties
Ponding: None
Flooding: Frequent
Runoff class: Negligible
Depth to a seasonal high water table: About 61 to 91 centimeters (24 to 36 inches)
Drainage class: Somewhat poorly drained
Hydrologic soil group: C

Typical profile
Oi—0 to 4 centimeters (0 to 2 inches); slightly decomposed plant material
A—4 to 10 centimeters (2 to 4 inches); silt loam
Bw—10 to 51 centimeters (4 to 20 inches); silty clay loam
2Cg—51 to 200 centimeters (20 to 79 inches); silty clay loam

Minor components

Dechel soils
Percentage of component in the map unit: About 10 percent
Landform: Swamps, marshes, backswamps, valley floors, stream terraces
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 5 centimeters (2 inches)
Total subsidence: About 20 centimeters (8 inches)

Mesei soils
Percentage of component in the map unit: About 8 percent

Landform: Valley floors, backswamps, marshes, swamps, stream terraces
Geomorphic position: Treads
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 50 centimeters (20 inches)
Total subsidence: About 102 centimeters (40 inches)

Oxic Dystrudepts
Percentage of component in the map unit: About 2 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Slope: 0 to 2 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained
Flooding: Frequent

631—Odesangel peat, 0 to 1 percent slopes

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: 0 to 25 meters (0 to 82 feet)
Landscape: Raised coralline platform islands, atolls, rock islands
Aspect: No dominant orientation
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Odesangel and similar soils—80 percent
Minor components—20 percent

Characteristics of the Odesangel soil

Landform: Depressions, scalped areas, anthropogenic fens, solution sinkholes, swamps, atolls
Geomorphic position: Dips
Parent material: Organic material derived predominantly from freshwater marsh vegetation overlying coralline sand and/or limestone
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 19.8 centimeters (7.8 inches); moderate
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 98 percent
Maximum initial subsidence: About 35 centimeters (14 inches)
Maximum total subsidence: About 75 centimeters (30 inches)

Hydrologic properties
Ponding: Frequent
Flooding: Frequent
Runoff class: Very low

Depth to a seasonal high water table: 0 centimeters (0 inches)
Drainage class: Very poorly drained
Hydrologic soil group: A/D

Typical profile
Oi—0 to 10 centimeters (0 to 4 inches); peat
Oe—10 to 28 centimeters (4 to 11 inches); mucky peat
Oa—28 to 45 centimeters (11 to 18 inches); muck
2C—45 to 200 centimeters (18 to 79 inches); gravelly sand

Minor components

Ngerungor soils
Percentage of component in the map unit: About 8 percent
Landform: Wet coastal bottom-land depressions
Hillslope position: Backslopes
Geomorphic position: Talf
Slope: 0 to 1 percent
Slope shape (down/across): Concave/concave
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 100 centimeters (39 inches)
Total subsidence: About 200 centimeters (79 inches)

Typic Haplohemists
Percentage of component in the map unit: About 5 percent
Landform: Wet coastal bottom-land depressions
Hillslope position: Backslopes
Geomorphic position: Talf
Slope: 0 to 1 percent
Slope shape (down/across): Concave/concave
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 15 centimeters (6 inches)
Total subsidence: About 30 centimeters (12 inches)

Typic Udifolists
Percentage of component in the map unit: About 5 percent
Landform: Karrens, karst cones, karst towers, karst valleys
Hillslope position: Summits, shoulders, backslopes, footslopes, toeslopes
Geomorphic position: Base slopes
Slope: 0 to 30 percent
Slope shape (down/across): Linear/concave
Drainage class: Excessively drained

Lithic Haplohemists
Percentage of component in the map unit: About 2 percent
Landform: Solution sinkholes, fen scalped areas, depressions, atolls
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 0 to 20 centimeters (0 to 8 inches) to lithic bedrock
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent

Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 50 centimeters (20 inches)

632—Ollei-Nekken complex, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 154 meters (3 to 505 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ollei and similar soils—50 percent
Nekken and similar soils—30 percent
Minor components—20 percent

Characteristics of the Ollei soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 30 to 50 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 4.1 centimeters (1.6 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 3 percent (low)
Aluminum saturation in the subsoil: About 27 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile
Oi—0 to 6 centimeters (0 to 2 inches); very gravelly slightly decomposed plant material
A—6 to 17 centimeters (2 to 7 inches); very gravelly highly organic silt loam

AB—17 to 28 centimeters (7 to 11 inches); very gravelly silty clay loam
Bw—28 to 41 centimeters (11 to 16 inches); very flaggy silty clay loam
R—41 to 66 centimeters (16 to 26 inches); bedrock

Characteristics of the Nekken soil

Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Crests, side slopes
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 35 percent by angular gravel and 10 percent by angular cobbles
Depth class: Moderately deep
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 10.4 centimeters (4.1 inches); low
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 5 percent (low)
Aluminum saturation in the subsoil: About 5 percent (low)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Oi—0 to 5 centimeters (0 to 2 inches); cobbly slightly decomposed plant material
A—5 to 22 centimeters (2 to 9 inches); cobbly silt loam
BCt—22 to 61 centimeters (9 to 24 inches); extremely cobbly silty clay loam
R—61 to 86 centimeters (24 to 34 inches); bedrock

Minor components

Rock outcrop
Percentage of component in the map unit: About 10 percent
Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 30 to 150 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Aimeliik soils
Percentage of component in the map unit: About 5 percent
Landform: Hills

Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Side slopes, base slopes, nose slopes, head slopes, interfluves, crests
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Dechel soils
Percentage of component in the map unit: About 4 percent
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Ngatpang soils
Percentage of component in the map unit: About 1 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Slope: 10 to 35 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

633—Ollei-Nekken complex, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 213 meters (3 to 699 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ollei and similar soils—55 percent
Nekken and similar soils—25 percent
Minor components—20 percent

Characteristics of the Ollei soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests, side slopes
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 50 to 75 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles

Depth class: Very shallow or shallow
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 3.5 centimeters (1.4 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 27 percent (moderate)
Aluminum saturation in the subsoil: About 27 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile
Oi—0 to 2 centimeters (0.0 to 0.8 inch); very gravelly slightly decomposed plant material
A—2 to 7 centimeters (1 to 3 inches); very gravelly highly organic silt loam
AB—7 to 32 centimeters (3 to 13 inches); very gravelly silty clay loam
R—32 to 57 centimeters (13 to 22 inches); bedrock

Characteristics of the Nekken soil

Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Crests, side slopes
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 5 percent by angular cobbles
Depth class: Moderately deep
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 9.3 centimeters (3.7 inches); low
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 5 percent (low)
Aluminum saturation in the subsoil: About 58 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None

Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Oi—0 to 3 centimeters (0 to 1 inch); slightly decomposed plant material
A—3 to 16 centimeters (1 to 6 inches); silt loam
Bt—16 to 27 centimeters (6 to 11 inches); very cobbly silty clay loam
C—27 to 62 centimeters (11 to 24 inches); very cobbly silty clay loam
R—62 to 87 centimeters (24 to 34 inches); bedrock

Minor components

Rock outcrop
Percentage of component in the map unit: About 10 percent
Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 50 to 150 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Aimeliik soils
Percentage of component in the map unit: About 5 percent
Landform: Hills
Hillslope position: Backslopes, shoulders, toeslopes, footslopes, summits
Geomorphic position: Head slopes, nose slopes, base slopes, side slopes, interfluves, crests
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Stream terraces, backswamps, marshes, swamps, valley floors
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 2 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, footslopes, backslopes
Geomorphic position: Interfluves, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

634—Ollei-Rock outcrop complex, 12 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 212 meters (3 to 696 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ollei and similar soils—50 percent
Rock outcrop—30 percent
Minor components—20 percent

Characteristics of the Ollei soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests, side slopes
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 12 to 75 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 15 to 50 centimeters (6 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 1.6 centimeters (0.6 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 3 percent (low)
Aluminum saturation in the subsoil: About 27 percent (moderate)
Potential vegetation: Aglaia palauensis (Meseueches), *Alpinia pubiflora* (Sui), *Asplenium nidus* (Buk'l beluu), *Colona scabra* (Uchab), *Eugenia reinwardtiana* (Kesiil), *Heterospathe* (Demaile), *Heterospathe elata palauensis* (Demalie), *Macaranga carolinensis* (Bedel), *Pouteria* sp (Elangel), *Rhus taitensis* (Ueches), *Schefflera elliptica* (Bungaruau), *Vittaria incurvata* (Kernigmes)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile
Oe—0 to 5 centimeters (0 to 2 inches); gravelly moderately decomposed plant material
A—5 to 10 centimeters (2 to 4 inches); gravelly highly organic silt loam
Bw—10 to 20 centimeters (4 to 8 inches); very flaggy silty clay loam
R—20 to 45 centimeters (8 to 18 inches); bedrock

Characteristics of Rock outcrop

Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Kind of bedrock: Andesitic, basaltic breccia and tuff
Slope: 12 to 75 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Hydrologic soil group: D

Minor components

Nekken soils
Percentage of component in the map unit: About 10 percent
Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests, side slopes
Slope: 12 to 75 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 7 percent
Landform: Hills
Hillslope position: Summits, shoulders, footslopes, backslopes, toeslopes
Geomorphic position: Base slopes, nose slopes, side slopes, interfluves, crests, head slopes
Slope: 12 to 75 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Dechel soils
Percentage of component in the map unit: About 3 percent
Landform: Backswamps, marshes, stream terraces, valley floors, swamps
Geomorphic position: Treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 10 centimeters (4 inches)
Total subsidence: About 20 centimeters (8 inches)

635—Palau silt loam, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 103 meters (2 to 338 feet)

Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau and similar soils—85 percent
Minor components—15 percent

Characteristics of the Palau soil

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Base slopes, head slopes, side slopes, nose slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 2 to 6 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 8.5 centimeters (3.3 inches); low
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
- *Ponding:* None
- *Flooding:* None
- *Runoff class:* Low
- *Drainage class:* Well drained
- *Hydrologic soil group:* C

Typical profile
- A—0 to 19 centimeters (0 to 7 inches); silt loam
- Bo1—19 to 31 centimeters (7 to 12 inches); silty clay loam
- Bo2—31 to 52 centimeters (12 to 20 inches); silty clay loam
- C—52 to 200 centimeters (20 to 79 inches); loam

Minor components

Ngardmau soils
Percentage of component in the map unit: About 6 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes, shoulders, summits
Geomorphic position: Side slopes, crests
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 5 percent

Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, backslopes, footslopes
Geomorphic position: Side slopes, interfluves
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Babelthuap soils
Percentage of component in the map unit: About 3 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Crests, side slopes
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 1 percent
Landform: Hills
Hillslope position: Shoulders, footslopes, summits, backslopes, toeslopes
Geomorphic position: Head slopes, crests, nose slopes, base slopes, side slopes, interfluves
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

636—Palau silty clay loam, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 148 meters (3 to 486 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau and similar soils—85 percent
Minor components—15 percent

Characteristics of the Palau soil

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Footslopes, shoulders, toeslopes, summits, backslopes
Geomorphic position: Side slopes, base slopes, nose slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 6 to 12 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high

Available water capacity: About 8.9 centimeters (3.5 inches); low
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 10 centimeters (0 to 4 inches); silty clay loam
BA—10 to 28 centimeters (4 to 11 inches); silty clay loam
Bo1—28 to 56 centimeters (11 to 22 inches); silty clay
Bo2—56 to 107 centimeters (22 to 42 inches); silty clay
BC—107 to 200 centimeters (42 to 79 inches); silty clay

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 6 percent
Landform: Drainageways, swales, hills
Hillslope position: Footslopes, toeslopes, backslopes
Geomorphic position: Interfluves, side slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngardmau soils
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, summits, toeslopes, shoulders
Geomorphic position: Crests, side slopes
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils
Percentage of component in the map unit: About 3 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Side slopes, crests
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 1 percent

Landform: Hills
Hillslope position: Footslopes, toeslopes, shoulders, backslopes, summits
Geomorphic position: Crests, nose slopes, interfluves, side slopes, base slopes, head slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

637—Palau silt loam, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 182 meters (3 to 597 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau and similar soils—85 percent
Minor components—15 percent

Characteristics of the Palau soil

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Shoulders, toeslopes, footslopes, backslopes, summits
Geomorphic position: Base slopes, nose slopes, head slopes, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 12 to 30 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 8.0 centimeters (3.1 inches); low
Shrink-swell potential: About 7 percent (high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 10 centimeters (0 to 4 inches); silt loam

Bo1—10 to 29 centimeters (4 to 11 inches); silty clay loam
Bo2—29 to 106 centimeters (11 to 42 inches); silty clay loam
C—106 to 200 centimeters (42 to 79 inches); loam

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 7 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, footslopes, backslopes
Geomorphic position: Side slopes, interfluves
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Babelthuap soils
Percentage of component in the map unit: About 4 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Crests, side slopes
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils
Percentage of component in the map unit: About 2 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Summits, backslopes, toeslopes, shoulders
Geomorphic position: Crests, side slopes
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Shoulders, footslopes, toeslopes, backslopes, summits
Geomorphic position: Nose slopes, base slopes, side slopes, interfluves, crests, head slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

638—Palau silt loam, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 203 meters (3 to 666 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau and similar soils—85 percent
Minor components—15 percent

Characteristics of the Palau soil

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Summits, shoulders, footslopes, toeslopes, backslopes
Geomorphic position: Side slopes, base slopes, nose slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 30 to 50 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 7.7 centimeters (3.0 inches); low
Shrink-swell potential: About 7 percent (high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 70 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ap—0 to 4 centimeters (0 to 2 inches); silt loam
Bo—4 to 150 centimeters (2 to 59 inches); silty clay loam
C—150 to 200 centimeters (59 to 79 inches); loam

Minor components

Babelthuap soils
Percentage of component in the map unit: About 7 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 3 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, footslopes, backslopes

Geomorphic position: Side slopes, interfluves
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngardmau soils
Percentage of component in the map unit: About 3 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Shoulders, toeslopes, backslopes, summits
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Toeslopes, shoulders, summits, backslopes, footslopes
Geomorphic position: Interfluves, side slopes, base slopes, head slopes, crests, nose slopes
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

639—Palau silt loam, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 223 meters (3 to 732 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau and similar soils—85 percent
Minor components—15 percent

Characteristics of the Palau soil

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Backslopes, toeslopes, footslopes, shoulders, summits
Geomorphic position: Nose slopes, base slopes, side slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 50 to 75 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 8.5 centimeters (3.3 inches); low
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)

Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 19 centimeters (0 to 7 inches); silt loam
Bo1—19 to 31 centimeters (7 to 12 inches); silty clay loam
Bo2—31 to 52 centimeters (12 to 20 inches); silty clay loam
C—52 to 200 centimeters (20 to 79 inches); silty clay loam

Minor components

Oxyaquic Dystrudepts
Percentage of component in the map unit: About 7 percent
Landform: Drainageways, swales, hills
Hillslope position: Toeslopes, backslopes, footslopes
Geomorphic position: Interfluves, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Babelthuap soils
Percentage of component in the map unit: About 3 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Crests, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils
Percentage of component in the map unit: About 3 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Shoulders, summits, backslopes, toeslopes
Geomorphic position: Side slopes, crests
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils
Percentage of component in the map unit: About 2 percent
Landform: Hills
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Crests, side slopes, base slopes, interfluves, head slopes, nose slopes
Slope: 50 to 75 percent

Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

640—Palau silty clay loam, bedded tuff substratum, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 4 to 76 meters (13 to 249 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau, bedded tuff substratum, and similar soils—75 percent
Minor components—25 percent

Characteristics of Palau silty clay loam, bedded tuff substratum

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Summits, toeslopes, backslopes, shoulders, footslopes
Geomorphic position: Base slopes, nose slopes, head slopes, side slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 2 to 6 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 9.3 centimeters (3.7 inches); low
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 13 centimeters (0 to 5 inches); silty clay loam
Bo—13 to 51 centimeters (5 to 20 inches); silty clay
C—51 to 200 centimeters (20 to 79 inches); silty clay

Minor components

Typic Udorthents, bedded tuff substratum
Percentage of component in the map unit: About 10 percent
Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Backslopes, shoulders, summits
Geomorphic position: Crests, side slopes
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils, bedded tuff substratum
Percentage of component in the map unit: About 7 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Side slopes, crests
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Shoulders, toeslopes, backslopes, summits
Geomorphic position: Crests, side slopes
Slope: 2 to 6 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 3 percent
Landform: Hills
Hillslope position: Footslopes, shoulders, summits, backslopes, toeslopes
Geomorphic position: Head slopes, side slopes, interfluves, crests, nose slopes, base slopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

641—Palau silty clay loam, bedded tuff substratum, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 92 meters (3 to 302 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau, bedded tuff substratum, and similar soils—75 percent
Minor components—25 percent

Characteristics of Palau silt loam, bedded tuff substratum

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Footslopes, toeslopes, summits, shoulders, backslopes
Geomorphic position: Nose slopes, head slopes, base slopes, side slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 6 to 12 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 9.6 centimeters (3.8 inches); low
Shrink-swell potential: About 6 percent (high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 15 centimeters (0 to 6 inches); silty clay loam
Bo—15 to 82 centimeters (6 to 32 inches); silty clay
C—82 to 200 centimeters (32 to 79 inches); silty clay loam

Minor components

Typic Udorthents, bedded tuff substratum
Percentage of component in the map unit: About 10 percent
Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, backslopes, shoulders
Geomorphic position: Side slopes, crests
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils, bedded tuff substratum
Percentage of component in the map unit: About 7 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Side slopes, crests
Slope: 6 to 12 percent

Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Shoulders, summits, backslopes, toeslopes
Geomorphic position: Crests, side slopes
Slope: 6 to 12 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 3 percent
Landform: Hills
Hillslope position: Footslopes, shoulders, summits, backslopes, toeslopes
Geomorphic position: Crests, interfluves, side slopes, base slopes, nose slopes, head slopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

642—Palau silt loam, bedded tuff substratum, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 162 meters (3 to 531 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau, bedded tuff substratum, and similar soils—75 percent
Minor components—25 percent

Characteristics of Palau silt loam, bedded tuff substratum

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Nose slopes, base slopes, side slopes, head slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 12 to 30 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high

Available water capacity: About 8.2 centimeters (3.2 inches); low
Shrink-swell potential: About 6 percent (high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 70 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 5 centimeters (0 to 2 inches); silt loam
Bo—5 to 81 centimeters (2 to 32 inches); silty clay loam
C—81 to 200 centimeters (32 to 79 inches); silt loam

Minor components

Typic Udorthents, bedded tuff substratum
Percentage of component in the map unit: About 10 percent
Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Backslopes, shoulders, summits
Geomorphic position: Crests, side slopes
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils, bedded tuff substratum
Percentage of component in the map unit: About 7 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Side slopes, crests
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Summits, shoulders, backslopes, toeslopes
Geomorphic position: Side slopes, crests
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 3 percent
Landform: Hills
Hillslope position: Footslopes, shoulders, summits, backslopes, toeslopes

Geomorphic position: Head slopes, nose slopes, base slopes, crests, interfluves, side slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

643—Palau silty clay loam, bedded tuff substratum, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 3 to 172 meters (10 to 564 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau, bedded tuff substratum, and similar soils—75 percent
Minor components—25 percent

Characteristics of Palau silty clay loam, bedded tuff substratum

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Toeslopes, shoulders, footslopes, summits, backslopes
Geomorphic position: Nose slopes, side slopes, base slopes, head slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 30 to 50 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 10.2 centimeters (4.0 inches); low
Shrink-swell potential: About 7 percent (high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 58 percent (moderate)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 13 centimeters (0 to 5 inches); silty clay loam

AB—13 to 24 centimeters (5 to 9 inches); silty clay loam
Bo—24 to 135 centimeters (9 to 53 inches); silty clay
CB—135 to 200 centimeters (53 to 79 inches); silt loam

Minor components

Typic Udorthents, bedded tuff substratum
Percentage of component in the map unit: About 10 percent
Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, shoulders, backslopes
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils, bedded tuff substratum
Percentage of component in the map unit: About 7 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Shoulders, summits, backslopes, toeslopes
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 3 percent
Landform: Hills
Hillslope position: Backslopes, summits, shoulders, toeslopes, footslopes
Geomorphic position: Crests, head slopes, nose slopes, base slopes, interfluves, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

644—Palau silty clay loam, bedded tuff substratum, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 20 to 99 meters (66 to 325 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)

Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Palau, bedded tuff substratum, and similar soils—75 percent
Minor components—25 percent

Characteristics of Palau silty clay loam, bedded tuff substratum

Landform: Hillslopes, anthropogenic terraces
Hillslope position: Backslopes, toeslopes, footslopes, shoulders, summits
Geomorphic position: Base slopes, side slopes, head slopes, nose slopes
Parent material: Saprolite derived from bedded andesitic-basaltic tuff, lapilli tuff, and volcanic breccia; includes the Ngardok Member of the Aimeliik Formation
Slope: 50 to 75 percent
Slope shape (down/across): Linear/convex
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 8.3 centimeters (3.3 inches); low
Shrink-swell potential: About 6 percent (moderate)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 70 percent (high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 6 centimeters (0 to 2 inches); silty clay loam
Bo—6 to 58 centimeters (2 to 23 inches); silty clay
C—58 to 200 centimeters (23 to 79 inches); silty clay

Minor components

Typic Udorthents, bedded tuff substratum
Percentage of component in the map unit: About 10 percent
Landform: Scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, backslopes, shoulders
Geomorphic position: Crests, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils, bedded tuff substratum
Percentage of component in the map unit: About 7 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Side slopes, crests
Slope: 50 to 75 percent

Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Ngardmau soils, bedded tuff substratum
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Shoulders, summits, backslopes, toeslopes
Geomorphic position: Crests, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Aimeliik soils, bedded tuff substratum
Percentage of component in the map unit: About 3 percent
Landform: Hills
Hillslope position: Backslopes, summits, shoulders, toeslopes, footslopes
Geomorphic position: Interfluves, crests, side slopes, base slopes, nose slopes, head slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

645—Peleliu extremely cobbly clay loam, 0 to 4 percent slopes

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: 1 to 33 meters (3 to 108 feet)
Landscape: Raised coralline platform islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Peleliu and similar soils—70 percent
Minor components—30 percent

Characteristics of the Peleliu soil

Landform: Solution platforms, wave-cut platforms, karrens
Hillslope position: Backslopes, toeslopes, footslopes, summits, shoulders
Geomorphic position: Side slopes, base slopes
Parent material: Coralline colluvium over residuum weathered from limestone; probably includes additions of volcanic ash and tropospheric dust; the bedrock includes the Peleliu and Palau Limestone Formations.
Slope: 0 to 4 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 25 percent by subangular gravel, 25 percent by subangular cobbles, and 3 percent by subangular stones
Depth class: Shallow
Depth to a restrictive feature: 20 to 50 centimeters (8 to 20 inches) to lithic bedrock

Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 2.6 centimeters (1.0 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 100 percent
Potential vegetation: Aidia cochinchinensis, *Badusa palauensis* (ralm), *Clerodendrum inerme*, *Cycas circinalis*, *Cyrtandra todaiensis*, *Eugenia reinwardtiana* (kesill), *Flacourtia rukam micronesica*, *Garcinia matudai* (tilol), *Geniostoma sessile*, *Guettarda speciosa* (belau), *Intsia bijuga* (dort), *Ixora casei*, *Meryta senfftiana*, *Morinda latibracteata* (ngel), *Polyscias grandifolia*, *Premna serratifolia* (osem), *Psychotria hombroniana*, *Psychotria* spp., *Rinorea* sp., *Tarenna sambucina*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very low
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 1 centimeter (0.0 to 0.4 inch); extremely cobbly slightly decomposed plant material
A—1 to 13 centimeters (0 to 5 inches); extremely cobbly clay loam
Bw—13 to 30 centimeters (5 to 12 inches); extremely gravelly clay loam
R—30 to 55 centimeters (12 to 22 inches); bedrock

Minor components

Chelbacheb soils
Percentage of component in the map unit: About 14 percent
Landform: Karrens, solution platforms, wave-cut platforms
Hillslope position: Backslopes, toeslopes, shoulders, summits, footslopes
Geomorphic position: Side slopes, base slopes
Slope: 0 to 4 percent
Slope shape (down/across): Linear/convex
Depth to a restrictive feature: 10 to 40 centimeters (4 to 16 inches) to lithic bedrock
Drainage class: Well drained

Odesangel soils
Percentage of component in the map unit: About 6 percent
Landform: Depressions, scalped areas, atolls, anthropogenic fens, solution sinkholes, swamps
Geomorphic position: Dips
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 30 centimeters (12 inches)
Total subsidence: About 75 centimeters (30 inches)

Rock outcrop
Percentage of component in the map unit: About 5 percent
Landform: Wave-cut platforms, karrens, solution platforms
Hillslope position: Shoulders

Geomorphic position: Crests
Slope: 0 to 4 percent
Slope shape (down/across): Linear/convex
Restrictive feature: Lithic bedrock at the surface

Ngedebus soils
Percentage of component in the map unit: About 5 percent
Landform: Beach terraces, back-barrier beaches, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Risers, treads
Slope: 0 to 2 percent
Slope shape (down/across): Linear/convex
Drainage class: Somewhat excessively drained
Flooding: Occasional

646—Peleliu-Chelbacheb complex, 6 to 20 percent slopes

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: 1 to 84 meters (3 to 276 feet)
Landscape: Raised coralline platform islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Peleliu and similar soils—60 percent
Chelbacheb and similar soils—25 percent
Minor components—15 percent

Characteristics of the Peleliu soil

Landform: Karrens, solution platforms
Hillslope position: Toeslopes, footslopes, summits, shoulders, backslopes
Geomorphic position: Side slopes, base slopes
Parent material: Coralline colluvium over residuum weathered from limestone; probably includes additions of volcanic ash and tropospheric dust; the bedrock includes the Peleliu and Palau Limestone Formations.
Slope: 6 to 20 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by subangular gravel, 40 percent by subangular cobbles, and 10 percent by subangular stones
Depth class: Shallow
Depth to a restrictive feature: 20 to 50 centimeters (8 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 3.2 centimeters (1.2 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 100 percent
Potential vegetation: Aidia cochinchinensis, *Badusa palauensis* (ralm), *Clerodendrum inerme*, *Cycas circinalis*, *Cyrtandra todaiensis*, *Eugenia reinwardtiana* (kesill), *Flacourtia rukam micronesica*, *Garcinia matudai* (tilol), *Geniostoma sessile*, *Guettarda speciosa* (belau), *Intsia bijuga* (dort), *Ixora casei*, *Meryta senfftiana*,

Morinda latibracteata (ngel), *Polyscias grandifolia*, *Premna serratifolia* (osem), *Psychotria hombroniana*, *Psychotria* spp., *Rinorea* sp., *Tarenna sambucina*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oi—0 to 5 centimeters (0 to 2 inches); extremely cobbly slightly decomposed plant material
A—5 to 20 centimeters (2 to 8 inches); extremely cobbly clay loam
Bw—20 to 40 centimeters (8 to 16 inches); extremely cobbly clay loam
R—40 to 65 centimeters (16 to 26 inches); bedrock

Characteristics of the Chelbacheb soil

Landform: Karrens, solution platforms
Hillslope position: Backslopes, summits, shoulders, footslopes, toeslopes
Geomorphic position: Side slopes, base slopes
Parent material: Organic material over residuum weathered from coral limestone
Slope: 6 to 20 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 20 percent by angular cobbles, 35 percent by angular gravel, and 5 percent by angular stones
Depth class: Very shallow or shallow
Depth to a restrictive feature: 10 to 40 centimeters (4 to 16 inches) to lithic bedrock
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Available water capacity: About 6.0 centimeters (2.4 inches); very low
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 95 percent
Potential vegetation: Aidia cochinchinensis, *Badusa palauensis* (ralm), *Clerodendrum inerme*, *Cycas circinalis*, *Cyrtandra todaiensis*, *Eugenia reinwardtiana* (kesill), *Flacourtia rukam micronesica*, *Garcinia matudai* (tilol), *Geniostoma sessile*, *Guettarda speciosa* (belau), *Intsia bijuga* (dort), *Ixora casei*, *Meryta senfftiana*, *Morinda latibracteata* (ngel), *Polyscias grandifolia*, *Premna serratifolia* (osem), *Psychotria hombroniana*, *Psychotria* spp., *Rinorea* sp., *Tarenna sambucina*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oa—0 to 20 centimeters (0 to 8 inches); extremely cobbly highly decomposed plant material
2R—20 to 40 centimeters (8 to 16 inches); bedrock

Minor components

Rock outcrop
Percentage of component in the map unit: About 5 percent

Landform: Karrens, solution platforms
Hillslope position: Shoulders
Geomorphic position: Crests
Slope: 6 to 20 percent
Slope shape (down/across): Convex/convex
Restrictive feature: Lithic bedrock at the surface

Typic Haprendolls
Percentage of component in the map unit: About 5 percent
Landform: Karrens, karst towers, karst cones
Hillslope position: Backslopes
Geomorphic position: Base slopes
Slope: 6 to 20 percent
Slope shape (down/across): Linear/convex
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Drainage class: Well drained

Rubble land
Percentage of component in the map unit: About 5 percent
Landform: Barrier flats, karrens, karst cones, karst towers
Hillslope position: Backslopes
Geomorphic position: Treads
Slope: 1 to 20 percent
Slope shape (down/across): Linear/linear

647—Peleliu-Chelbacheb-Rock outcrop complex, 80 to 150 percent slopes

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia)
Elevation: 2 to 214 meters (7 to 702 feet)
Landscape: Rock islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Peleliu and similar soils—40 percent
Chelbacheb and similar soils—30 percent
Rock outcrop—25 percent
Minor components—5 percent

Characteristics of the Peleliu soil

Landform: Saddles, swales, karrens, karst cones, karst towers
Hillslope position: Footslopes, toeslopes, backslopes, shoulders, summits
Geomorphic position: Head slopes, side slopes
Parent material: Coralline colluvium over residuum weathered from limestone; probably includes additions of volcanic ash and tropospheric dust; the bedrock includes the Peleliu and Palau Limestone Formations.
Slope: 80 to 150 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 5 percent by subangular boulders, 60 percent by subangular cobbles, 10 percent by subangular gravel, and 15 percent by subangular stones

Depth class: Shallow
Depth to a restrictive feature: 20 to 50 centimeters (8 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 2.0 centimeters (0.8 inch); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 100 percent
Potential vegetation: Aidia cochinchinensis, *Badusa palauensis* (ralm), *Clerodendrum inerme*, *Cycas circinalis*, *Cyrtandra todaiensis*, *Eugenia reinwardtiana* (kesill), *Flacourtia rukam micronesica*, *Garcinia matudai* (tilol), *Geniostoma sessile*, *Guettarda speciosa* (belau), *Intsia bijuga* (dort), *Ixora casei*, *Meryta senfftiana*, *Morinda latibracteata* (ngel), *Polyscias grandifolia*, *Premna serratifolia* (osem), *Psychotria hombroniana*, *Psychotria* spp., *Rinorea* sp., *Tarenna sambucina*

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oe—0 to 5 centimeters (0 to 2 inches); extremely cobbly moderately decomposed plant material
A—5 to 15 centimeters (2 to 6 inches); extremely cobbly clay loam
Bw—15 to 27 centimeters (6 to 11 inches); extremely cobbly clay loam
R—27 to 52 centimeters (11 to 20 inches); bedrock

Characteristics of the Chelbacheb soil

Landform: Karrens, karst cones, karst towers, karst valleys
Hillslope position: Toeslopes, footslopes, backslopes, summits, shoulders
Geomorphic position: Head slopes, side slopes
Parent material: Organic material over residuum weathered from coral limestone
Slope: 80 to 150 percent
Slope shape (down/across): Linear/concave
Percentage of the surface covered by rock fragments: About 20 percent by angular cobbles, 35 percent by angular gravel, and 5 percent by angular stones
Depth class: Very shallow or shallow
Depth to a restrictive feature: 10 to 40 centimeters (4 to 16 inches) to lithic bedrock
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Available water capacity: About 6.0 centimeters (2.4 inches); very low
Shrink-swell potential: About 0 percent (low)
Soil slippage potential: Low
Aluminum saturation in the topsoil: About 0 percent
Calcium carbonate maximum: About 95 percent
Potential vegetation: Aidia cochinchinensis, *Badusa palauensis* (ralm), *Clerodendrum inerme*, *Cycas circinalis*, *Cyrtandra todaiensis*, *Eugenia reinwardtiana* (kesill), *Flacourtia rukam micronesica*, *Garcinia matudai* (tilol), *Geniostoma sessile*, *Guettarda speciosa* (belau), *Intsia bijuga* (dort), *Ixora casei*, *Meryta senfftiana*, *Morinda latibracteata* (ngel), *Polyscias grandifolia*, *Premna serratifolia* (osem), *Psychotria hombroniana*, *Psychotria* spp., *Rinorea* sp., *Tarenna sambucina*

Hydrologic properties
Ponding: None

Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: B

Typical profile
Oa—0 to 20 centimeters (0 to 8 inches); extremely gravelly highly decomposed plant material
2R—20 to 40 centimeters (8 to 16 inches); bedrock

Characteristics of Rock outcrop

Landform: Karrens, karst cones, karst towers, karst valleys
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests
Kind of bedrock: Coralline limestone; includes the Peleliu and Palau Limestone Formations
Slope: 80 to 150 percent
Slope shape (down/across): Convex/convex
Restrictive feature: Lithic bedrock at the surface

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Medium
Hydrologic soil group: D

Minor components

Ngedebus soils
Percentage of component in the map unit: About 4 percent
Landform: Beach terraces, back-barrier beaches, beach ridges, beaches, generally on the lagoon side of atolls
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Slope: 0 to 2 percent
Slope shape (down/across): Linear/convex
Drainage class: Somewhat excessively drained
Flooding: Occasional

Rubble land
Percentage of component in the map unit: About 1 percent
Landform: Karrens, barrier flats, karst cones, karst towers
Hillslope position: Backslopes
Geomorphic position: Treads
Slope: 80 to 100 percent
Slope shape (down/across): Linear/linear

648—Tabecheding silty clay loam, 2 to 6 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 3 to 62 meters (10 to 203 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Tabecheding and similar soils—85 percent
Minor components—15 percent

Characteristics of the Tabecheding soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 33.8 centimeters (13.3 inches); very high
Shrink-swell potential: About 11 percent (very high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 86 percent (very high)
Aluminum saturation in the subsoil: About 92 percent (very high)
Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: Occasional
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 35 to 50 centimeters (14 to 20 inches)
Drainage class: Somewhat poorly drained
Hydrologic soil group: D

Typical profile
A—0 to 10 centimeters (0 to 4 inches); silty clay loam
Bto—10 to 73 centimeters (4 to 29 inches); cobbly silty clay
CBt—73 to 83 centimeters (29 to 33 inches); silty clay
C—83 to 100 centimeters (33 to 39 inches); clay
2Cg—100 to 200 centimeters (39 to 79 inches); very paragravelly silty clay

Minor components

Aquic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Backslopes, shoulders, summits, footslopes, toeslopes
Slope: 2 to 6 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Ngatpang soils
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, shoulders, footslopes, toeslopes, backslopes
Slope: 2 to 6 percent

Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Lithic Haploperox
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, shoulders, footslopes, backslopes, summits
Slope: 2 to 6 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

649—Tabecheding silty clay loam, 6 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 105 meters (3 to 344 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Tabecheding and similar soils—80 percent
Minor components—20 percent

Characteristics of the Tabecheding soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, toeslopes, shoulders, backslopes, footslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 32.4 centimeters (12.8 inches); very high
Shrink-swell potential: About 13 percent (very high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 86 percent (very high)
Aluminum saturation in the subsoil: About 92 percent (very high)
Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: Occasional
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 35 to 50 centimeters (14 to 20 inches)
Drainage class: Somewhat poorly drained

Hydrologic soil group: D

Typical profile
A—0 to 10 centimeters (0 to 4 inches); silty clay loam
Bto—10 to 50 centimeters (4 to 20 inches); cobbly silty clay
CBt—50 to 60 centimeters (20 to 24 inches); silty clay
C—60 to 90 centimeters (24 to 35 inches); clay
2Cg—90 to 200 centimeters (35 to 79 inches); very paragravelly silty clay

Minor components

Lithic Haploperox
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, shoulders, toeslopes, footslopes, backslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

Aquic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, shoulders, summits, toeslopes, backslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Drainage class: Moderately well drained

Ngatpang soils
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

650—Aquic Dystrudepts, 2 to 12 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 81 meters (3 to 266 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aquic Dystrudepts and similar soils—90 percent
Minor components—10 percent

Characteristics of Aquic Dystrudepts

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, shoulders, backslopes, footslopes, toeslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation

Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Percentage of the surface covered by rock fragments: About 15 percent by angular gravel
Depth class: Very deep
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 25.0 centimeters (9.8 inches); high
Shrink-swell potential: About 15 percent (very high)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 86 percent (very high)
Aluminum saturation in the subsoil: About 86 percent (very high)
Potential vegetation: Cyperaceae (Sedge), *Ectrosia lepornia*, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Melestoma malabrathicum*, *Nepenthes mirabilis* (Meliik), *Pandanus tectorius* (Ongor), *Paspalum orbiculare*, *Poaceae* (grasses)

Hydrologic properties
Ponding: Occasional
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 25 to 40 centimeters (10 to 16 inches)
Drainage class: Somewhat poorly drained
Hydrologic soil group: C/D

Typical profile
A—0 to 10 centimeters (0 to 4 inches); gravelly silty clay loam
CBg—10 to 200 centimeters (4 to 79 inches); clay

Minor components

Tabecheding soils
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

Ngatpang soils
Percentage of component in the map unit: About 3 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, shoulders, backslopes, footslopes, summits
Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Lithic Haploperox
Percentage of component in the map unit: About 2 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Slope: 6 to 12 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock

Drainage class: Well drained

651—Tabecheding silty clay loam, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 3 to 73 meters (10 to 239 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Tabecheding and similar soils—80 percent
Minor components—20 percent

Characteristics of the Tabecheding soil

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, backslopes, shoulders, summits, toeslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth class: Very deep
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 33.3 centimeters (13.1 inches); very high
Shrink-swell potential: About 13 percent (very high)
Soil slippage potential: Medium
Aluminum saturation in the topsoil: About 86 percent (very high)
Aluminum saturation in the subsoil: About 92 percent (very high)
Potential vegetation: Aglaia palauensis (Meseueches), *Campnosperma brevipetiolata* (Kelelacharm), *Cerbera* sp. (Cemeridech), *Eleocarpus joga* (Dekemerir), *Gmelina palauensis* (Blacheos), *Horsfieldia palauensis* (Chersachel), *Pandanus aimiriikensis* (Ertochet), *Parinari* (Bkau), *Pinanga insignis* (Ebouch), *Pterocarpus indicus* (Las), *Rhus taitensis* (Ueches), *Semecarpus venuosa* (Tonget)

Hydrologic properties
Ponding: Occasional
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 35 to 50 centimeters (14 to 20 inches)
Drainage class: Somewhat poorly drained
Hydrologic soil group: D

Typical profile
A—0 to 18 centimeters (0 to 7 inches); silty clay loam
Bto—18 to 51 centimeters (7 to 20 inches); silty clay
CBt—51 to 86 centimeters (20 to 34 inches); silty clay
C—86 to 104 centimeters (34 to 41 inches); clay
2Cg—104 to 200 centimeters (41 to 79 inches); very paragravelly silty clay

Minor components

Ngatpang soils
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, footslopes, backslopes, shoulders, summits
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Aquic Dystrudepts
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Footslopes, toeslopes, summits, backslopes, shoulders
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Drainage class: Somewhat poorly drained

Lithic Haploperox
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, shoulders, backslopes, summits, footslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

652—Aquic Dystrudepts, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 6 to 71 meters (20 to 233 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Aquic Dystrudepts and similar soils—75 percent
Minor components—25 percent

Characteristics of Aquic Dystrudepts

Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Summits, shoulders, backslopes, toeslopes, footslopes
Parent material: Interbedded clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airi Clay Formation
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Percentage of the surface covered by rock fragments: About 10 percent by angular gravel and 5 percent by subrounded gravel
Depth class: Very deep
Most limiting permeability (Ksat): 0.0036 to 0.036 cm/hr (0.0015 to 0.014 in/hr); low
Available water capacity: About 29.9 centimeters (11.8 inches); high
Shrink-swell potential: About 15 percent (very high)

Soil slippage potential: High
Aluminum saturation in the topsoil: About 86 percent (very high)
Aluminum saturation in the subsoil: About 86 percent (very high)
Potential vegetation: Cyperaceae (Sedge), *Ectrosia lepornia*, *Gleichenia linearis* or *Dicranopteris linearis*, *Lycopodium cernuum*, *Melestoma malabrathicum*, *Nepenthes mirabilis* (Meliik), *Pandanus tectorius* (Ongor), *Paspalum orbiculare*, *Poaceae* (grasses)

Hydrologic properties
Ponding: Occasional
Flooding: None
Runoff class: Very high
Depth to a seasonal high water table: About 25 to 40 centimeters (10 to 16 inches)
Drainage class: Somewhat poorly drained
Hydrologic soil group: C/D

Typical profile
A—0 to 10 centimeters (0 to 4 inches); gravelly silty clay loam
BC—10 to 65 centimeters (4 to 26 inches); clay
Cg—65 to 200 centimeters (26 to 79 inches); clay

Minor components

Ngatpang soils
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Drainage class: Moderately well drained

Tabecheding soils
Percentage of component in the map unit: About 10 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Backslopes, toeslopes, summits, shoulders, footslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 10 to 20 centimeters (4 to 8 inches) to an abrupt textural change
Drainage class: Somewhat poorly drained
Ponding: Occasional

Lithic Haploperox
Percentage of component in the map unit: About 5 percent
Landform: Dissected fluviomarine terraces on low hills
Hillslope position: Backslopes, footslopes, shoulders, summits, toeslopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/concave
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to paralithic bedrock
Drainage class: Well drained

653—Typic Udorthents complex, mined, 0 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)

Elevation: 10 to 221 meters (33 to 725 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Typic Udorthents, 30 to 75 percent slopes, and similar soils—45 percent
Typic Udorthents, 0 to 6 percent slopes, and similar soils—40 percent
Minor components—15 percent

Characteristics of Typic Udorthents, 30 to 75 percent slopes

Landform: Scalped areas, bauxite surface mines on hills
Hillslope position: Shoulders, summits, backslopes
Geomorphic position: Side slopes, crests
Parent material: Bauxite (aluminum ore) composed of saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 30 to 75 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.1 centimeters (7.5 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 88 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 2 centimeters (0.0 to 0.8 inch); extremely gravelly silt loam
AC—2 to 12 centimeters (1 to 5 inches); gravelly silty clay
C—12 to 200 centimeters (5 to 79 inches); silty clay

Characteristics of Typic Udorthents, 0 to 6 percent slopes

Landform: Scalped areas, bauxite surface mines on hills
Hillslope position: Backslopes, summits, shoulders
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Slope: 0 to 6 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep

Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.4 centimeters (7.6 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 91 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Low
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 4 centimeters (0 to 2 inches); extremely gravelly silt loam
C—4 to 200 centimeters (2 to 79 inches); silty clay

Minor components

Ngardmau soils
Percentage of component in the map unit: About 10 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Summits, backslopes, toeslopes, shoulders
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Drainage class: Well drained

Babelthuap soils
Percentage of component in the map unit: About 5 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Crests, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

654—Orthents-Urban land complex, 0 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia); 194 (Low Limestone Islands of Western Micronesia)
Elevation: 0 to 173 meters (0 to 568 feet)
Landscape: Volcanic islands (fig. 15)
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Typic Udorthents and similar soils—45 percent

Figure 15.—An area of Orthents-Urban land complex, 0 to 50 percent slopes, which is densely covered with buildings and other impermeable surfaces or has been highly modified by earth-moving activities. The bare soil indicates the difficulty in revegetating disturbed volcanic soils. This area is located in Ngaremlengui State, Babeldaob Island. Photo courtesy of Dr. Pat Colin, Coral Reef Research Foundation.

Urban land—40 percent
Minor components—15 percent

Characteristics of Typic Udorthents

Landform: Leveled land, scalped areas, erosional crests and ridges on hills
Hillslope position: Summits, shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Human-transported material derived from either saprolitic volcanic rocks or limestone
Slope: 0 to 50 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 60 percent by subrounded gravel and 15 percent by subangular cobbles
Depth class: Very deep
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 19.5 centimeters (7.7 inches); moderate
Shrink-swell potential: About 5 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 88 percent (very high)
Aluminum saturation in the subsoil: About 91 percent (very high)
Potential vegetation: Cassythya filiformis, *Drosera* sp., *Nepenthes mirabilis* (Meliik)

Hydrologic properties
Ponding: None

Flooding: None
Runoff class: Medium
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
Ac—0 to 1 centimeter (0.0 to 0.4 inch); extremely gravelly silt loam
C1—1 to 29 centimeters (0 to 11 inches); gravelly silty clay
C2—29 to 200 centimeters (11 to 79 inches); silty clay

Characteristics of Urban land

Landform: Urban land
Kind of material: Human-transported material
Slope: 0 to 50 percent
Slope shape (down/across): Linear/linear

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Hydrologic soil group: D

Minor components

Aimeliik soils
Percentage of component in the map unit: About 8 percent
Landform: Hills
Hillslope position: Summits, shoulders, toeslopes, footslopes, backslopes
Geomorphic position: Head slopes, side slopes, nose slopes, base slopes, crests, interfluves
Slope: 0 to 50 percent
Slope shape (down/across): Linear/linear
Depth to a restrictive feature: 5 to 25 centimeters (2 to 10 inches) to an abrupt textural change
Drainage class: Well drained

Palau soils
Percentage of component in the map unit: About 5 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Backslopes, summits, shoulders, footslopes, toeslopes
Geomorphic position: Head slopes, nose slopes, base slopes, side slopes
Slope: 0 to 50 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Dechel soils
Percentage of component in the map unit: About 2 percent
Landform: Valley floors, backswamps, marshes, stream terraces, swamps
Geomorphic position: Treads
Slope: 0 to 1 percent
Slope shape (down/across): Linear/linear
Drainage class: Very poorly drained
Flooding: Frequent
Ponding: Frequent
Initial subsidence: About 5 centimeters (2 inches)
Total subsidence: About 20 centimeters (8 inches)

655—Quarry

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia); 193 (Volcanic Islands of Western Micronesia)
Elevation: 0 to 140 meters (0 to 459 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Quarry—100 percent

Characteristics of Quarry

Landform: Quarries
Kind of material: Andesite, dacite, basaltic breccia, and tuff (Ngeremlengui Formation or Ngardok Member of the Aimeliik Formation); also, limestone (Palau Limestone Formation)
Slope: 0 to 100 percent
Slope shape (down/across): Convex/convex

Hydrologic properties
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: None noted

656—Water, brackish

Map unit setting

Major land resource area: 194 (Low Limestone Islands of Western Micronesia); 193 (Volcanic Islands of Western Micronesia)
Elevation: Sea level
Landscape: Open ocean, marine lakes, lagoons
Landform: Marine lakes, salt- or brackish-water sewage lagoons
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Water, brackish—100 percent

657—Water, fresh

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia); 194 (Low Limestone Islands of Western Micronesia)
Elevation: Sea level
Landscape: Lakes, lagoons
Landform: Areas of freshwater, ponds
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Water, fresh—100 percent

659—Nekken-Ollei complex, lower fertility, 12 to 30 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 211 meters (3 to 692 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Nekken, lower fertility, and similar soils—60 percent
Ollei, lower fertility, and similar soils—30 percent
Minor components—10 percent

Characteristics of Nekken, lower fertility, soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 5 percent by angular cobbles
Depth class: Moderately deep
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 11.1 centimeters (4.4 inches); low
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 6 percent (low)
Aluminum saturation in the subsoil: About 47 percent (moderate)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile
A—0 to 16 centimeters (0 to 6 inches); very cobbly silt loam

Bt—16 to 62 centimeters (6 to 24 inches); very cobbly silty clay loam
R—62 to 87 centimeters (24 to 34 inches); bedrock

Characteristics of Ollei, lower fertility, soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests, side slopes
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 12 to 30 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 15 to 50 centimeters (6 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 2.5 centimeters (1.0 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 42 percent (moderate)
Aluminum saturation in the subsoil: About 57 percent (moderate)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile
A—0 to 8 centimeters (0 to 3 inches); silt loam
Bw—8 to 14 centimeters (3 to 6 inches); very gravelly silt loam
CB—14 to 21 centimeters (6 to 8 inches); extremely flaggy silt loam
R—21 to 46 centimeters (8 to 18 inches); bedrock

Minor components

Rock outcrop
Percentage of component in the map unit: About 4 percent
Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 12 to 150 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Palau soils
Percentage of component in the map unit: About 4 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Backslopes, toeslopes, footslopes, shoulders, summits

Geomorphic position: Head slopes, nose slopes, base slopes, side slopes
Slope: 12 to 30 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Babelthuap soils
Percentage of component in the map unit: About 2 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Side slopes, crests
Slope: 12 to 30 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

660—Ollei-Rock outcrop complex, lower fertility, 30 to 50 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 194 meters (3 to 636 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ollei, lower fertility, and similar soils—50 percent
Rock outcrop—30 percent
Minor components—20 percent

Characteristics of Ollei, lower fertility, soil

Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 30 to 50 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 15 to 50 centimeters (6 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 4.6 centimeters (1.8 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 19 percent (moderate)
Aluminum saturation in the subsoil: About 57 percent (moderate)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona*

(Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Drainage class: Well drained
Hydrologic soil group: D

Typical profile
A—0 to 18 centimeters (0 to 7 inches); silt loam
Bw—18 to 28 centimeters (7 to 11 inches); very gravelly silty clay loam
C—28 to 43 centimeters (11 to 17 inches); extremely flaggy silty clay loam
R—43 to 68 centimeters (17 to 27 inches); bedrock

Characteristics of Rock outcrop

Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Kind of bedrock: Andesitic, basaltic breccia and tuff
Slope: 30 to 50 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Hydrologic properties
Ponding: None
Flooding: None
Runoff class: Very high
Hydrologic soil group: D

Minor components

Nekken, lower fertility, soils
Percentage of component in the map unit: About 10 percent
Landform: Coastal benches and ridges on hills
Hillslope position: Backslopes, shoulders
Geomorphic position: Side slopes, crests
Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Drainage class: Well drained

Palau soils
Percentage of component in the map unit: About 8 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Backslopes, footslopes, summits, toeslopes, shoulders
Geomorphic position: Base slopes, head slopes, nose slopes, side slopes
Slope: 30 to 50 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Babelthuap soils
Percentage of component in the map unit: About 2 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Backslopes, toeslopes
Geomorphic position: Crests, side slopes

Slope: 30 to 50 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

661—Ollei-Nekken complex, lower fertility, 50 to 75 percent slopes

Map unit setting

Major land resource area: 193 (Volcanic Islands of Western Micronesia)
Elevation: 1 to 213 meters (3 to 699 feet)
Landscape: Volcanic islands
Aspect: No dominant orientation
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Map unit composition

Ollei, lower fertility, and similar soils—60 percent
Nekken, lower fertility, and similar soils—25 percent
Minor components—15 percent

Characteristics of Ollei, lower fertility, soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 50 to 75 percent
Slope shape (down/across): Linear/convex
Percentage of the surface covered by rock fragments: About 40 percent by angular gravel and 5 percent by angular cobbles
Depth class: Very shallow or shallow
Depth to a restrictive feature: 25 to 50 centimeters (10 to 20 inches) to lithic bedrock
Most limiting permeability (Ksat): 3.6 to 36 cm/hr (1.42 to 14.17 in/hr); high
Available water capacity: About 3.7 centimeters (1.5 inches); very low
Shrink-swell potential: About 2 percent (low)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 42 percent (moderate)
Aluminum saturation in the subsoil: About 42 percent (moderate)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties
- *Ponding:* None
- *Flooding:* None
- *Runoff class:* Very high
- *Drainage class:* Well drained
- *Hydrologic soil group:* D

Typical profile

A—0 to 7 centimeters (0 to 3 inches); very gravelly silt loam
AB—7 to 32 centimeters (3 to 13 inches); very gravelly silty clay loam
R—32 to 57 centimeters (13 to 22 inches); bedrock

Characteristics of Nekken, lower fertility, soil

Landform: Coastal benches and ridges on hills
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation.
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Percentage of the surface covered by rock fragments: About 5 percent by angular cobbles
Depth class: Moderately deep
Depth to a restrictive feature: 50 to 100 centimeters (20 to 39 inches) to lithic bedrock
Most limiting permeability (Ksat): 0.360 to 3.6 cm/hr (0.142 to 1.42 in/hr); moderately high
Available water capacity: About 10.0 centimeters (3.9 inches); low
Shrink-swell potential: About 4 percent (moderate)
Soil slippage potential: High
Aluminum saturation in the topsoil: About 6 percent (low)
Aluminum saturation in the subsoil: About 58 percent (moderate)
Potential vegetation: Bumannia ledermannii (Emudelach), *Hedyotis cornifola* (Emudelach), *Hedyotis korrorensis* (Emudelach), *Hedyotis suborthogona* (Emudelach), *Hedyotis tomentosa* (Emudelach), *Hedyotis verticilata scaberria* (Emudelach), *Pandanas* sp. (Buuk), *Trichomanes motleyi*, *Trichomanes setigerum*, *Trichospermum ledermanni* (Elsau)

Hydrologic properties

Ponding: None
Flooding: None
Runoff class: High
Drainage class: Well drained
Hydrologic soil group: C

Typical profile

A—0 to 16 centimeters (0 to 6 inches); silt loam
Bt—16 to 27 centimeters (6 to 11 inches); very cobbly silty clay loam
C—27 to 62 centimeters (11 to 24 inches); very cobbly silty clay loam
R—62 to 87 centimeters (24 to 34 inches); bedrock

Minor components

Palau soils

Percentage of component in the map unit: About 8 percent
Landform: Hillslopes, anthropogenic terraces
Hillslope position: Footslopes, shoulders, summits, toeslopes, backslopes
Geomorphic position: Base slopes, nose slopes, head slopes, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Linear/convex
Drainage class: Well drained

Rock outcrop

Percentage of component in the map unit: About 5 percent

Landform: Ridges
Hillslope position: Shoulders
Geomorphic position: Free faces
Slope: 50 to 75 percent
Slope shape (down/across): Linear/linear
Restrictive feature: Lithic bedrock at the surface

Babelthuap soils
Percentage of component in the map unit: About 2 percent
Landform: Erosional crests and ridges on hills
Hillslope position: Toeslopes, backslopes
Geomorphic position: Crests, side slopes
Slope: 50 to 75 percent
Slope shape (down/across): Convex/convex
Depth to a restrictive feature: 3 to 10 centimeters (1 to 4 inches) to an abrupt textural change
Drainage class: Well drained

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture, as forestland, and as sites for buildings, sanitary facilities, local roads and streets, and as sites for parks and other recreational facilities. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of roadfill and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited,* and *poorly suited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00 or from 0.000 to 1.000. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

By Michael P. Robotham, Ph.D., and Christopher W. Smith, Ph.D, Natural Resources Conservation Service.

This section provides suggestions on the general management of crops and pasture in Palau. Users of this soil survey who are designing agricultural management systems for individual fields or farms should also consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.”

Crops

The soils in this survey area, as in other tropical environments, have special limitations that must be considered if good yields are to be obtained over an extended period of time. Poor management practices can lead to severe damage to the soils, and reclamation may not be economically feasible. A large percentage of the soils in the survey area are suited to the production of adapted crops for local use and export; however, only a very small percentage is currently used for crops. One of the most important components of management is the choice of crops that are adapted to local soil conditions. For example, wetland taro and similar crops are adapted to wet soil conditions, but growing such crops on uplands is impossible or extremely difficult. Also, many upland crops do not grow well in lowland areas where soils are wet for a significant part of the year.

In general, the most fertile soils in this survey area are those that are under forest vegetation, mainly because of large amounts of organic matter, which provides nutrients for plants. As fallen leaves and branches rot, organic matter and nutrients are returned to the soil. Before these nutrients can be leached through the soil and lost, roots absorb them and the process begins again. In this way, forest soils retain their fertility. In addition, the forest canopy and layer of fallen and dead leaves (called litter) provide protection from erosion. The canopy also provides shade, which keeps the temperature lower, keeps the surface layer from drying out too quickly, and may provide a better habitat for beneficial soil organisms. If the forest cover is removed and the land is used for cultivated, the content of organic matter in the soil is reduced, nutrients are more easily lost, and the soil becomes less productive.

Water Availability and Management

The availability and management of water significantly affect crop production in this survey area. Dechel, Mesei, Ngerungor, and Odesangel soils are wet for all of the year or for a significant part of the year. As a consequence, these soils are suitable only for the cultivation of a small number of crops. They have been traditionally used for wetland taro. Draining these soils in order to allow the cultivation of other crops is not recommended. When wetland soils are drained, they lose their volume as the organic matter in the soils is oxidized.

Efficient and appropriate water management is important in the soils on uplands in the survey area. Plowing up and down slopes increases water runoff, but it also increases the hazard of erosion, which lowers the productivity of the soil. Conservation

practices, such as diversions, hillside ditches, vegetative barriers, terraces, and grassed waterways, slow and direct surface water flow to stable outlets and away from fields or living areas.

Even soils that receive a lot of rainfall during the rainy season may require supplemental irrigation during the dry season. The amount and timing of irrigation water applications depend on the needs of the crop and the ability of the soil to hold water. Some soils, such as the sandy Ngedebus soils, have a high permeability rate and a low water-holding capacity. Thus, water soaks in quickly and does not stay long in the soils. These soils should be irrigated more frequently than more slowly permeable soils and with smaller amounts of water during each irrigation run. Soils with slower permeability and a higher water-holding capacity, such as Palau soils, can be managed with larger water applications on a less frequent basis.

Erosion Control

Soil erosion is a very important consideration affecting crop production on many soils in the survey area. It is the process through which soil particles are removed from the soil surface by water and transported off the field and into streams and coastal waters. Erosion can greatly reduce the suitability of most soils in the survey area for crop production. In soils on volcanic uplands and in soils on marine terraces, nearly all of the soil fertility is in the topsoil, the upper 10 to 15 centimeters (4 to 6 inches) of the soil. The topsoil should be maintained or enhanced with organic matter if the soils are to be productive. The subsoil in these soils generally is much less fertile than the topsoil and has aluminum and other elements that stunt the growth of many plants and are effectively toxic to plants. Erosion in upland areas is one of the major causes of increased siltation of near-shore mangrove and coral reef areas throughout the survey area.

If possible, crop cultivation that involves tillage should be conducted on soils with gentle slopes. If the steeper slopes must be cultivated, measures should be taken to reduce the risk of erosion. The most important way to reduce this risk is to keep the soil covered with living plants or mulch. This cover protects the soil from the impact of raindrops. It also increases the rate of water infiltration and therefore decreases the runoff rate and the hazard of erosion. The amount of cover can be increased by applications of mulch. Mulch includes any type of organic material (e.g., grasses, tree leaves, and coconut fronds) that is applied to the ground between and around growing plants. In addition to protecting the soil from erosion, mulching also can retard weed growth and increase the content of organic matter in the soils.

In areas where the risk of erosion is medium, conservation practices, such as contour tillage, contour stripcropping, vegetative barriers, and terraces, should be used to decrease the risk of erosion. Annual crops should not be cultivated in areas where the risk of erosion is high or very high. Some of these areas may be suitable for adapted perennial crops or forests.

Nutrient Management

All plants require carbon, hydrogen, and oxygen, which they obtain from air and water, and they require mineral nutrients for growth. Some nutrients, called macronutrients, are required in relatively large amounts. These include nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S). Other nutrients, called micronutrients, are needed in relatively small amounts. These include manganese (Mn), iron (Fe), boron (B), copper (Cu), zinc (Zn), molybdenum (Mo), cobalt (Co), and chlorine (Cl). Physical and chemical soil characteristics affect how nutrients can and should be managed for increased crop production without causing pollution. Information about plant nutrient management in tropical and subtropical environments is available in a University of Hawaii publication (Silva and Uchida, 2000).

Organic matter is the most important part of soil fertility in Palau soils. It increases the ability of the soil to retain nutrients and water. It improves soil structure and tilth. It also provides a home for soil organisms that are an important part of nutrient cycles. Tillage, especially mechanical tillage, can quickly decrease the content of organic matter in tropical soils. In addition, when soil is eroded, topsoil (where nearly all the soil fertility resides) is lost more quickly than other parts of the soil. Care should be taken in all cropping systems to minimize the loss of topsoil and organic matter. Using adequate amounts of mulch and/or compost and returning all crop residue to the soil after harvest are the simplest ways to maintain the content of organic matter in cropped areas.

Different groups of soils in Palau have common soil fertility problems that are directly related to the types and amounts of nutrients occurring in the soils and whether or not they are available to plants.

In general, soil fertility is not a major issue in cropped areas of wet bottom-land soils (Dechel, Mesei, Ngersuul, Ngerungor, and Odesangel soils) if traditional methods of managing organic matter are used. These soils can lose fertility over time, however, if organic matter is not returned to the soils as crop residue or mulch.

In most of the soils on uplands and marine terraces of the volcanic islands, the upper 10 to 15 centimeters (4 to 6 inches) has the most nutrients for plant growth. These include Aimeliik, Babelthuap, Ngardmau, Ngatpang, Palau, and Tabecheding soils. Of these, Aimeliik soils are the most fertile and the Babelthuap and Ngardmau soils are the least fertile. Nutrient management on upland soils in Palau is difficult. The soils in nonforested areas have low fertility in both the topsoil and subsoil. They are low in content of organic matter, are generally acidic, and lack sufficient phosphorus for adequate plant growth. Also, they generally are low in other macronutrients, including potassium and nitrogen. Forested soils in Palau (primarily Aimeliik soils) have relatively fertile topsoil, but they can quickly lose their fertility after forest clearing, burning, and then cultivation, which can lower the content of organic matter. Burning as a land-clearing or land-management practice should be avoided in any upland areas (forests or grassland) in Palau. Burning greatly speeds up the process of soil degradation. There may be a short-term increase in soil fertility immediately after the fire, but the effect is only temporary and nutrients will not be available for crops in later years.

Organic fertilizers can be used to restore and potentially increase the fertility of all soils in the survey area. These fertilizers include animal manure, fish meal, and compost. Compost is created when fresh organic materials, such as leaves and grasses, food wastes, animal manure, are collected in one place and allowed to age (decompose) over time. This process concentrates the materials and can increase the content of nutrients. Composts are typically easier to move around and spread than the original organic materials. Organic fertilizers are often called “slow release” fertilizers. All of the nutrients in organic fertilizer materials are typically not available to plants right away. Instead, they become available over time. This slow release of nutrients makes the cycling of nutrients more likely and generally decreases the risk that the fertilizers will cause pollution. Organic fertilizers also commonly provide both macronutrients and micronutrients that are important for plant growth.

Composting

Making good compost requires five ingredients: water, oxygen, carbon, nitrogen, and decomposing organisms, such as worms. Water and oxygen come from the rain and from the air, and the decomposing organisms already occur in the environment. Carbon and nitrogen should be added to the compost as fresh organic material.

To make compost, organic materials are collected in one place called a compost pile. The compost pile should be located near a source of fresh material and in an area free of standing water and not subject to flooding. A level, shady spot is desirable

because it helps to keep the pile from becoming too dry during the hot months of the year. If the pile is too dry, the materials will not decompose. Keeping the pile from becoming too wet also is important.

Banana and coconut leaves are a good cover for the compost pile because they allow air to penetrate the pile and they provide shade. Also, a plastic sheet can be used, or the compost pile can be located under a roof. In order to tell if the pile has the right amount of moisture, pick up a handful of compost and squeeze it in your hand. The compost should feel moist, but liquid should not drip out. If the compost is too wet, turn the pile and add more dry material. If the compost is too dry, add water if it is available or remove all or part of the cover for a short time and allow rain to moisten the pile naturally. Piles should be a minimum of 1 meter (40 inches) high, 1 meter wide, and 1 meter long. Smaller piles create compost much more slowly. Larger piles also work well, but managing piles that are too high or too wide (over 1.5 meters or 60 inches) can be difficult. A fence can be used to maintain the size and shape of the pile. Tree logs 3 to 6 centimeters (1 to 2.5 inches) in diameter and 1 to 1.5 meters (40 to 60 inches) long make good fences.

The best compost consists of materials that are high in nitrogen and materials that are high in carbon. Materials that are high in nitrogen include green leaves, grasses, legumes, fruit and vegetable trimmings, and kitchen scraps. If they are available, other waste products, such as fish meal and animal manure, can be added to the pile. For composting to work well, it is important to mix the materials that are high in nitrogen with the materials that are high in carbon. Materials that are high in carbon include twigs and small branches that are chopped into small pieces, palm fronds, coconut husks (chopped or shredded), and fern stems. In general, a ratio of 1 part nitrogen-rich materials to 3 parts carbon-rich materials is best for composting.

If the compost pile has been made properly, it will heat up in a few days. The internal temperature will rise. Ideally, the temperature should reach at least 50 degrees C (122 degrees F). The temperature can be checked by inserting a metal rod into the pile. If it is too hot to be held comfortably, the temperature is correct. The pile should stay hot for at least 3 to 5 days, and then it should be turned. Turning the pile speeds up the composting process and also makes sure that the pile stays hot enough to kill any weed seeds or disease organisms that are present. Turning the pile is especially important manure, food wastes, or other waste materials (such as fish-processing wastes) are added to the pile. When the pile is turned, the unrotted portions of the pile, i.e., the top and sides, should be placed on the bottom. The rest of the pile should be loosened to add air. Once the entire pile has been turned over, it should be covered again. The temperature will rise as before, and the rotting process will start again. The temperature should be regularly. When the temperature rises again, the pile should stay hot for a few days before it is turned the pile again. This process should be repeated until the compost is a dark, loose or crumbly material without any strong or unpleasant odors. The compost is now ready to be added to a garden or other agricultural area. If space is available, having multiple piles of different ages is a good idea. Having multiple ensures a nearly steady supply of compost.

Because of the amount of time and energy used in its production, compost should be used wisely. For example, the compost can be placed in narrow, deep rows or mixed into the upper 15 centimeters of the soil. If a garden has permanent beds or rows, compost can be added to them during each planting. Soil that is rich in compost is loose and needs little, if any, preparation before planting. Compost can provide additional nutrients to perennial crops if it is mixed with soil material before planting holes are refilled or if it is spread around the base of newly planted tree seedlings. If compost is spread around trees, care should be taken not to place the compost directly on the tree trunks. Compost placed on the tree trunks can increase the risk of pests and diseases.

General resources on composting are available from the NRCS Palau Field Office. Additional information also is available from the Palau Bureau of Agriculture and from *Backyard Composting: Recycling a Natural Product* (CTAHR, 2002).

Synthetic Fertilizers

Synthetic fertilizers (sometimes called inorganic fertilizers) can increase soil fertility. They provide different plant nutrients, depending on what is included in the fertilizer formula. Typical nitrogen fertilizers include urea and ammonium nitrate. Potash is a typical source of potassium. Phosphate and super phosphate fertilizers provide phosphorus, and lime (calcium carbonate) provides calcium and reduces soil acidity. Other specific fertilizer formulations provide micronutrients that may be important for the growth of specific crops. If more than one fertilizer is included in the formulation, the percentage of each component is expressed in the order N, K_2O, and P_2O_5; that is, a bag of 15-15-15 contains 15 percent nitrogen (N), 15 percent potassium (as potassium oxide, K_2O) and 15 percent phosphorus (as phosphate, P_2O_5) by weight.

The major advantage of using synthetic fertilizers for crop production is that they can be handled easily and provide nutrients nearly immediately after application. Care are should be taken, however, to maximize the effectiveness of the inorganic fertilizers and to minimize the risk of pollution. Soils on volcanic uplands and those on marine terraces have a low capacity to retain nutrients. It is easy to apply too much synthetic fertilizers on these soils. The fertilizers should not be applied if hard rains that could wash them away are expected. Fertilizer that is eroded from the field will not be available for crops and can cause pollution in streams or the ocean.

Soils on volcanic uplands and those on marine terraces can “fix” phosphorus, making applied phosphorus only slowly available for plants. Because about three-quarters of applied phosphorus is sorbed on these soils, it is important that phosphorus fertilizers be applied in a band or bands in the area where plant roots are growing or will be growing. Broadcasting fertilizer on crops planted in rows is an inefficient application method on all soils. Phosphorus also should be applied in bands on soils in areas of limestone and coral sand, where the phosphorus can combine with calcium and form insoluble calcium phosphate.

Soil acidity is has important effects on the fertility of soils on volcanic uplands and of soils on marine terraces. Acid soils are often deficient in some nutrients, such as calcium and magnesium, and may have high levels of aluminum, which can result in stunted growth and poor root development. Each agricultural crop responds differently to high levels of soluble aluminum. Some plants, such as Chinese cabbage and tomatoes, are highly sensitive. Other plants, including cassava, yams, pineapple, sweet potatoes, sugarcane, noni, and black pepper, are much less sensitive to aluminum in the soils.

Soil acidity can be reduced by applications of lime. Crushed coral and coral sand are locally available forms of lime that can be used to reduce acidity. They are commonly available at low cost. It usually takes time to see the positive effects of these materials as they dissolve slowly over time. Their effectiveness can be improved by grinding the coral and/or sand to the finest grain size possible. Dolomite, which contains a large amount of magnesium and calcium, agriculture lime, quicklime, and slaked lime are other liming materials. In addition to decreasing soil acidity, all of these materials provide calcium, which is needed for plant growth.

Increasing the content of organic matter through mulching and other means also decreases the negative effects of soil acidity on crop production by making soluble aluminum less available to plants. For most of the upland soils, the soil pH needs to be raised to only about 5.5 in order to remove soluble aluminum as a problem for plant growth. On many acid soils, between 2 and 4 tons of lime per hectare are required to raise the soil pH to 5.5 or higher. Another method to determine the approximate lime requirement is to multiply the amount of extractable aluminum (Al) in the topsoil

(shown in the table “Chemical Soil Properties”) by 2. The result is the amount of lime needed in tons per hectare. If feasible, the lime should be incorporated into the topsoil and the upper part of the subsoil before planting. Testing of soil pH is necessary after harvesting to determine if further applications of lime are needed. After the soil pH has been raised to the desired level, additional applications should be made for as long as 5 years or more.

The content of calcium and magnesium is adequate in Ngedebus and Majuro soils. Without organic matter, however, these soils have the least ability to hold nutrients of any of the soils in the survey area; therefore, maintaining a high content of organic matter is very important.

Weed and Pest Control

Weed- and pest-control options can affect both cultivated crops and the environment. Because maintenance of organic matter is one of the most important components of soil and nutrient management in the survey area, weed-control methods that retain plant residue on the field are recommended for all soils in Palau. Tillage for weed control is not recommended on the upland soils.

Chemical herbicides should be used according to label directions. Care should be taken when herbicides are used near water bodies (streams or the ocean) and on soils in which the water table is at or near the surface, such as Dechel, Ngersuul, Mesei, Ngerungor, and Odesangel soils.

Integrated pest management (IPM) is the most environmentally sound way to manage pests in agricultural systems. IPM involves identifying the pest problem, determining whether or not the pest is having a significant impact on production, identifying control measures, evaluating those measures (for cost, safety, availability, etc.), implementing the control, and measuring the effectiveness. Both manual and chemical controls can be part of IPM. If chemical controls (insecticides, nematicides, and fungicides) are to be used, care should be taken to minimize adverse environmental impacts. Pesticides should be applied with extreme care on soils with a high leaching potential (e.g., Ngedebus and Majuro soils) and a high runoff potential since these conditions make it easier for the pesticides to cause pollution. Traditional management systems and current multispecies and multistory cropping systems, such as agroforestry, take advantage of another IPM principle. In agricultural systems in which many crops and trees are present at the same time and no type of plant is concentrated in one place, it is much harder for insects to increase their numbers and to become a problem.

Land Clearing

Because of the difficulty in reestablishing trees in cleared areas, clearing of currently forested areas for crop production is not recommended. Agroforestry systems are more environmentally friendly for more intensive management of currently forested areas. If forested areas are to be cleared for clean-tilled crop production, the organic-rich topsoil can be conserved by slashing all understory vegetation, girdling trees, and allowing time for the leaves to drop. The forest litter on the soil surface either should be allowed to remain in place or should be raked and composted and returned to the garden later.

Areas of savanna or grassland that are cleared for subsistence clean-tilled crops (either annuals or perennials) should never be burned. If vegetation is burned, some nutrients remain in the ashes, but many are lost, including nitrogen, sulfur, and phosphorus. The organic matter that could have been added to the soil also is lost. Instead of burning, grass and other vegetation should be cut by hand. If possible, cut materials should be allowed to compost on the soil surface as mulch or should be tilled into the soil. If materials must be removed, they should be composted and the compost

returned to the field as fertilizer. This method reduces the loss of organic matter and helps to maintain soil fertility.

In areas that are cleared for the construction of houses or other buildings, most if not all of the topsoil generally is from the immediate construction area. On Babeldaob Island, homesite development and other kinds of development generally occur on soils in areas of volcanic uplands or marine terraces. Revegetating these soils and stabilizing the construction sites to prevent erosion will be challenging because of unfavorable physical and chemical properties in the subsoil. As was indicated earlier, organic matter is a key component of soil health and productivity. When a site is ready to be stabilized after construction activity, the soils in the cleared areas will need to build up their supply of organic matter. Applying 15 centimeter (6 inches) of surface mulch is a good way to protect the soil surface from immediate erosion. The mulch will decompose and build a thin topsoil. Adding lime and a small amount of synthetic fertilizer and seeding desired plants at this time can start the revegetation process. After a thin topsoil forms (in 3 to 5 years), the soil will have a limited capacity to retain synthetic fertilizers. Revegetating Ngatpang, Tabecheding, and other soils on marine terraces is complicated by the additional challenge of improving soil quality and dealing with wet soil conditions. When sites any kind of construction activity are selected, these soils should be avoided for because of very unfavorable chemical and physical properties.

Farming Systems

Although many of the soil properties that affect soil fertility and crop production apply in all cases when crops are grown, there are specific issues and concerns related to the type of farming that is being practiced. The common types of farming in Palau can be divided into four general groups. These are subsistence agroforestry systems, subsistence annual cropping systems, commercial annual cropping systems, and commercial perennial cropping systems.

Subsistence agroforestry systems.—Subsistence agroforestry crop production generally is the least damaging to the soil and requires the least human and monetary resources. Agroforestry crops can include food crops, such as upland taro, that can be grown in the forest understory; fruits, such as breadfruit, bananas, and papaya; perennial tree crops, such as noni; and wood crops. Agroforestry systems also can provide commercial products for sale, such as wood for woodcarving, fruits, herbs, vegetables, and medicinal plants. Soils under mature forest are best suited to the development of agroforestry systems.

If an agroforestry system is being established on forest soils, such as Aimeliik, Nekken, Ngatpang, and Ollei soils, undesirable woodland species should be removed before seeds, seedlings, cuttings, and suckers are planted. Burning should not be used. A desirable mixture of vegetation in an established planting might include wetland taro in the moist areas near drainageways and breadfruit, coconut, mango, and adapted timber species in the other areas. Desirable understory vegetation might include bananas, plantain, pineapples, yams, and certain dryland taro species that are tolerant of shade, such as *Alocasia*. After planting, little care is required. Undesirable understory vegetation should be slashed, and the cuttings should be concentrated around the root zones of desirable vegetation. Applications of commercial fertilizer normally are not needed if all crop residue is returned to the soil.

Establishing an agroforestry system in areas of grassland or in areas dominated by ferns is more difficult. Heavy additions of green manure, compost, and other organic fertilizers are necessary to ensure a good survival rate of the plantings in these areas. Continued application of fertilizer may be necessary until the canopy is established. Grasses should be cleared only from areas around plantings. Grasses and ferns growing between the plantings should be trimmed, and the cuttings should be spread around the trees. Ensuring that the cuttings do not directly touch the tree

trunks reduces the likelihood that slugs and snails will eat the tree seedlings. For most tree species, applications of lime and phosphorus are recommended as part of the establishment process. Because of low soil fertility and high amounts of soluble aluminum, establishing an agroforestry system in these areas will take many years.

Subsistence annual cropping systems.—Subsistence clean-tilled annual crop production is common in Palau. The commonly grown crops are cassava, sweet potato, sugarcane, dryland taro, and vegetable crops, such as Chinese cabbage, onions, eggplants, and tomatoes. Wetland taro is grown mainly on Dechel, Mesei, Ngerungor, and Odesangel soils. The main limitations affecting clean-tilled crop production are loss of the topsoil through erosion and loss of organic matter through oxidation and erosion. No-till and reduced-till cultivation systems, mulching, vegetative barriers, and other appropriate conservation practices and applications of organic fertilizer can reduce the hazard of erosion and help to maintain the content of organic matter.

Commercial annual cropping systems.—Commercial clean-tilled annual crop production is still practiced in Palau. The commonly grown crops are cassava, sweet potato, sugarcane, dryland taro, and vegetable crops, such as Chinese cabbage, onions, eggplants, and tomatoes. Wetland taro is grown mainly on Dechel, Mesei, Ngerungor, and Odesangel soils. The main limitations affecting clean-tilled crop production are loss of the topsoil through erosion and loss of organic matter through oxidation and erosion. Mechanical tillage is common in areas where these systems are used. If mechanical tillage is to be used in areas of soils on uplands or marine terraces, especially the soils that have high aluminum levels in the subsoil, cultivation should be confined to the upper 10-15 centimeters (4 to 6 inches) of the soils. The soils should be tilled on the contour and never up and down the slope. No-till and reduced-till cultivation systems, mulching, vegetative barriers, and other appropriate conservation practices and applications of organic fertilizer can reduce the hazard of erosion and help to maintain the content of organic matter. When commercial fertilizers and chemical herbicides and pesticides are applied, care should be taken to minimize adverse environmental impacts.

Commercial perennial cropping systems.—Commercial perennial crop production (in orchards) is becoming more common in areas of soils on volcanic uplands or marine terraces in Palau. The commonly grown crops are noni, mango, and other fruit trees. The main limitations affecting perennial crop production are loss of the topsoil through erosion and loss of organic matter through oxidation and erosion. Appropriate land clearing methods that minimize disturbance of the soil surface and the existing vegetation during the establishment period of the orchards can minimize losses of soil and organic matter. Because of the need to prevent channeling of runoff, the trees should be planted on the contour and not directly uphill from one. Once the trees have been established, a ground cover of grasses or other low-growing species between the trees provides the most protection for the soil and helps to maintain the content of organic matter. On steep slopes, other conservation practices, including diversions, hillside ditches, vegetative barriers, and terraces can help to control runoff and minimize erosion. When commercial fertilizers and chemical herbicides and pesticides are applied, care should be taken to minimize adverse environmental impacts.

Pasture

On Babeldaob Island, some grassland has the potential for livestock grazing. The land should be managed so that productivity is maintained and soil degradation is minimized. The soils in areas of grassland are mainly those in the Palau series and, to a lesser extent, those in the Nekken, Ollei, and Ngatpang series.

Babelthuap, Ngardmau, Ngatpang, and degraded soils are poorly suited to livestock grazing. Forage production and quality are limited on these soils mainly by very

low soil fertility. Fertilization and seeding tests have been conducted at the Nekken Forestry Station. The results show that it is feasible to reclaim some areas of these soils for livestock grazing. More information can be obtained from the Palau Bureau of Agriculture.

The sustained production of forage on all upland soils is limited by low soil fertility. Ollei soils also are limited by a shallow rooting depth. The average carrying capacity of the soils ranges from about 3 hectares per animal unit if no fertilizer is applied to as high as 1 hectare per animal unit if fertilizer is applied. Even if soil productivity can be improved, soil degradation can occur through exposure of subsoil via animal trails, compaction, increased runoff, and erosion. Similar but more chemically favorable volcanic soils on Guam have developed erosion problems when grazed by cattle. In the uplands on Babeldaob Island, volcanic soils with less favorable soil chemistry than related soils on Guam are likely to be more easily and severely degraded by cattle grazing.

Grazing Management

On all soils, good management practices help to maintain a desirable quality and yield of grasses and legumes and reduce the hazard of erosion. Proper grazing use that maintains the height of forage at about 15 to 25 centimeters is needed. Also, rotating the cattle from pasture to pasture to helps to prevent overgrazing. Mineral blocks are needed to fulfill animal nutritional requirements because of minor deficiencies in elements, such as zinc, in many areas. Periodically removing the mineral blocks improves grazing distribution and lessens the hazard of the formation of cattle trails, especially on moderately sloping to steep areas, where cattle trails can greatly increase the risk of erosion. Once subsoil is exposed, it is unlikely to be revegetated and stabilized naturally. Exposed subsoil result, in headwall erosion that is difficult to contain as it works its way upslope.

Care should be taken to prevent overgrazing of pastured areas. Overgrazing results in soil compaction, which restricts root development, and in depletion of organic matter and nutrients, which reduces fertility, yields, and the rate of recovery. Overgrazing also increases the hazard of erosion and can result in the introduction and proliferation of weedy species. Undergrazing can lead to a dramatic reduction in the nutritional value of the forage. Proper grazing management depends on the number and type of animals and the amount of forage available. A local livestock professional can provide assistance in developing an appropriate grazing management plan.

Livestock Water

To prevent water pollution from eroded soil and animal manure, pastures should be fenced so that livestock do not have direct access to streams. Portable pumps should be used to move water from streams or livestock-watering ponds to portable water troughs in the pasture. Since livestock congregate around water, regularly moving the troughs helps to prevent soil degradation and improves grazing distribution. If troughs are fixed, constructing a stamping area made of gravel or concrete helps to prevent excessive erosion and soil degradation.

Livestock-watering ponds can be constructed to provide a local source of water. They generally can be located in depressional areas or near drainageways if a concrete diversion is installed from the drainageway to the pond. Ponds should not be constructed in existing wetland areas. Properly constructing the ponds results in minimal disturbance to existing natural areas, such as forests and streams. Sandy bottom-land soils, such as Ngedebus soils, are not suitable for pond construction because of a high rate of permeability. Ponds on these soils must be lined. Experience has shown that ponds constructed on upland volcanic soils also may have difficulty holding water.

Pasture Improvement

Forage species should be adapted to the site and should either be native to or naturalized to the area. Species with toxic and invasive qualities should not be planted. Common species may include guineagrass and stargrass. If areas of grassland are improved for use as pasture, the method used depends on the quality of the grassland. Improvement of a stand of tall, thick grasses should begin by allowing the cattle to heavily graze the grasses and thereby trample and turn under much of the dry materials near the base of the plant. This step reduces the extent of competition from the grasses so that forage legumes can be established. Legumes provide livestock with an extra source of nutrients and improve soil conditions. Tree-forage legumes also can provide shelter and fodder for domestic animals and for wildlife. Secondly, grazing should be deferred to other areas. Thirdly, seeding with legumes and applications of fertilizer are needed. For maximum plant production, about 36 to 45 kilograms per hectare of nitrogen should be applied. Phosphorus also should be applied to encourage the growth of legumes that, in turn, provide additional nitrogen to the soil. Applications of liming material, such as coral sand, may be necessary for good grass growth in areas where the soils are acid.

Areas under a stand of short, sparse grasses should be disked, seeded, and fertilized. Soils on volcanic uplands or on marine terrace should not be tilled to a depth of more than 10 to 15 centimeters (4 to 6 inches). Restricting the depth of tillage helps to prevent mixing of the more fertile surface layer with the less fertile subsurface layers. Applications of coral sand or other liming material may be necessary for good grass growth in areas where the soils are acid. If equipment is available, phosphorus should be applied when the grasses and legumes are seeded. Recently established pastures should not be grazed until a satisfactory stand of grasses and/or legumes is established. Establishment of the stand takes a minimum of 3 to 5 months, depending on soil and climatic conditions. Only suitable forage grass species should be established. Species with potentially toxic or invasive qualities should not be selected.

Scattered trees should be established in all pastured areas. Trees provide shade for the cattle during the heat of the day and can reduce stress on the animals. To decrease mortality, tree seedlings and saplings should be protected from livestock browsing with portable fencing until the tree leaves are higher than the height of the cattle. Silvopastoral systems can be adopted in most areas. These systems establish a combination of trees and forage grasses. The trees are either distributed throughout the paddock or are used as living fences. They must have additional value as timber, posts, or fodder. Locally available fodder tree species include *Gliricidia sepium* and *Sesbania grandiflora*. Timber trees also can be established, but fencing is needed to protect saplings from livestock damage.

Major Land Resource Areas

A major land resource area (MLRA) is a broad geographic area that has a distinct combination of soil, climate, topography, vegetation, land use, and general type of farming (USDA, 2006). Three of these nationally designated areas are wholly or partly in the survey area. These areas are Volcanic Islands of Western Micronesia, MLRA 193; Low Limestone Islands of Western Micronesia, MLRA 194; and Coral Atolls of Micronesia, MRLA 196 (figs. 16 to 21). The major land resource areas of the map units in this survey area are identified in the section “Detailed Soil Map Units.”

MLRA 193, Volcanic Islands of Western Micronesia.—This area makes up most of the survey area. It includes the islands of Babeldaob, Koror, Malakal, and Arakabesan in the northern part of Palau. These islands are characterized by uplands underlain by volcanic rocks and by level to very steep slopes, deep dendritic drainageways, and generally rounded hills. Raised marine terraces are exposed in a few areas. Bauxite and ceramic clay were mined on Babeldaob Island in the 1920s

and 1930s. The highest elevation is about 242 meters (794 feet), on Babeldaob Island. The native vegetation consists of tropical hardwood trees and savanna grasses. Small streams and rivers occur in this area. Mangrove swamps, barrier reefs, and some fringing reefs surround the islands. The surrounding reef systems and open waters have a wide range of coral, anemones, shellfish, and other marine and pelagic fish species. The average annual rainfall is about 3,685 millimeters (145 inches). The average annual temperature is 27 degrees C (81 degrees F), and there are no frosts. Humidity averages about 90 percent at night and 75 to 80 percent during the day. Typhoons are not common in this area.

Forest, grassland, and agroforestry dominate the current land uses. The valley bottoms and low areas along the coast are the most productive agricultural lands. Traditional agroforestry systems are dominant. Truck crops are grown on small commercial farms on uplands and bottom lands on the island of Babeldaob. Coconut, breadfruit, betel nut, papaya, bananas, cassava, and taro are the principal crops.

MLRA 194, Low Limestone Islands of Western Micronesia.—This area includes hundreds of islands in the southern part of the Palau archipelago. The main islands in this MLRA are Peleliu and Angaur along with more than 350 smaller uninhabited Rock Islands. This area is characterized by low, raised coralline limestone islands. Angaur and Peleliu Islands are mostly flat and have an elevation of 5 to 10 meters (15 to 30 feet). Prominent ridges of rugged limestone are as much as 80 meters (262 feet) above sea level. Phosphate deposits were once mined on Angaur and Peleliu Islands. North of these islands lies a maze of large and small, extremely steep and rugged limestone islands, referred to as the Rock Islands. The area supports a diverse limestone forest community. It has no streams. Mangrove swamps are on Peleliu and Angaur Islands. Barrier reefs and some fringing reefs surround these islands. The

Figure 16.—View south toward Arakabesan Island and the Rock Islands. The foreground is MLRA 193 (Volcanic Islands of Western Micronesia), and the background is MLRA 194 (Low Limestone Islands of Western Micronesia). The volcanic landscapes have smoother and gentler slopes suitable for urbanization in contrast to the very steep and rugged limestone landscapes.

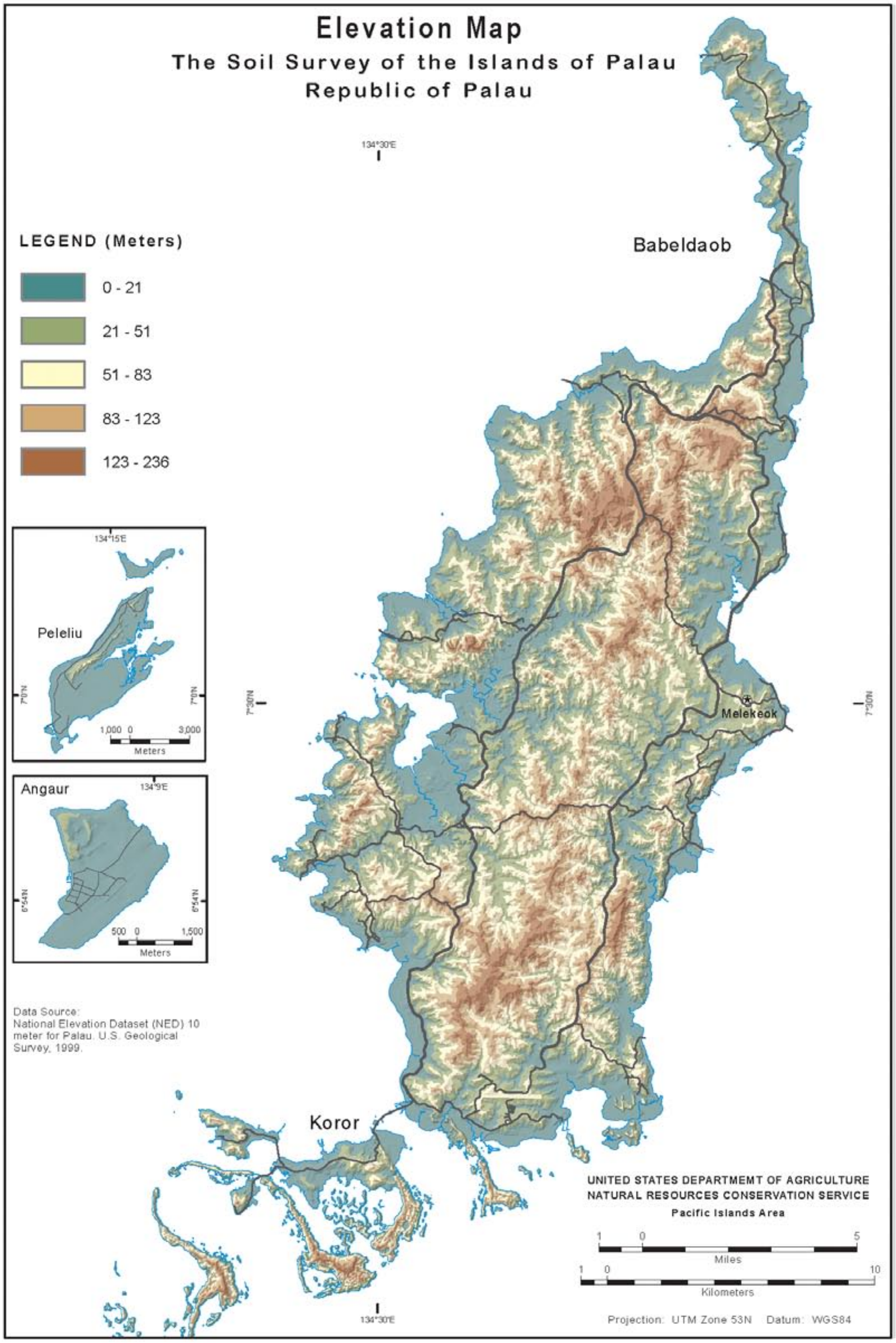

Figure 17.—Elevation map of the main Palau islands.

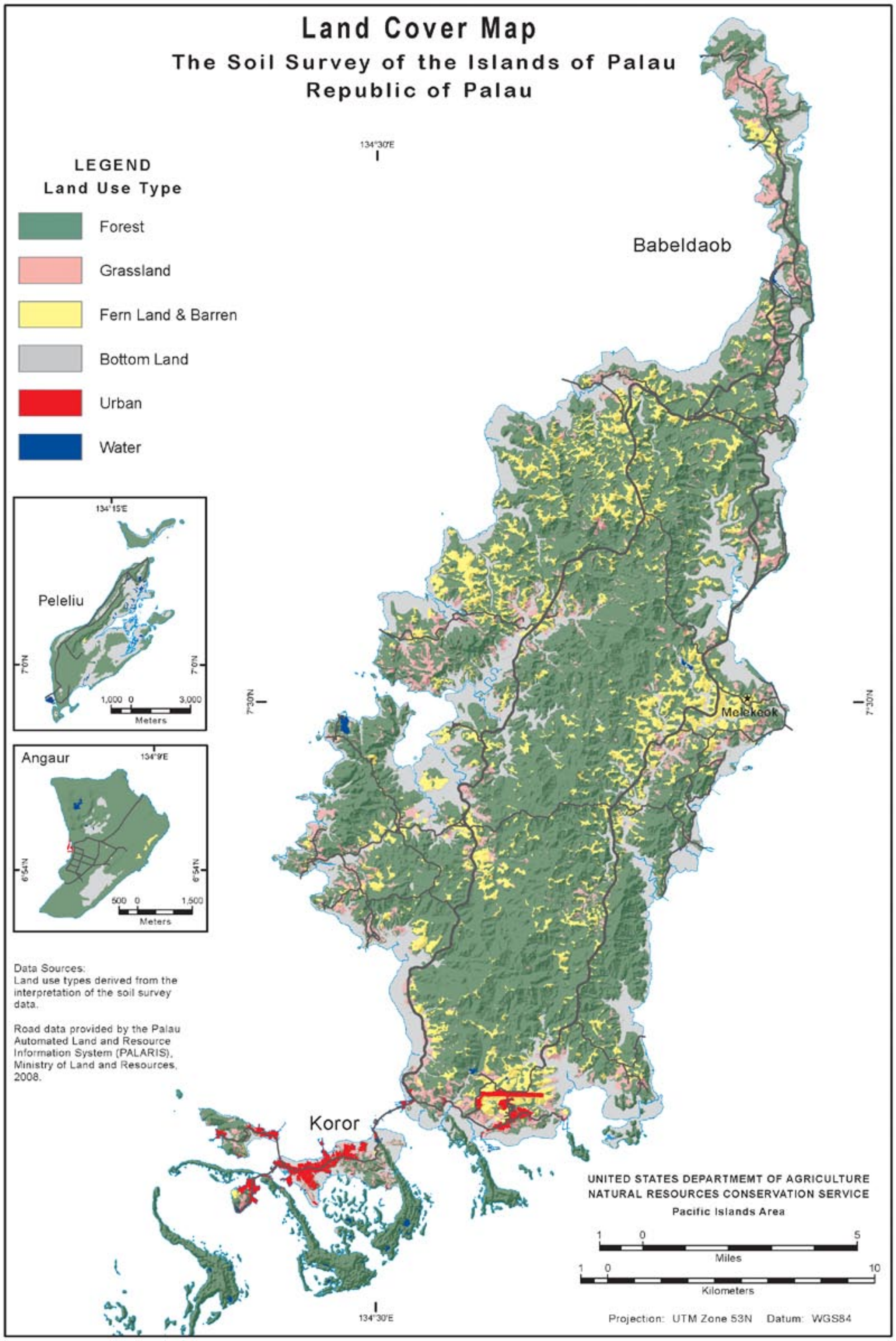

Figure 18.—Land cover map of the main Palau islands based on detailed soil map units. Forest cover is dominant. Nonforest areas include grassland and fern land. Barren land includes bauxite mines and severely gullied areas.

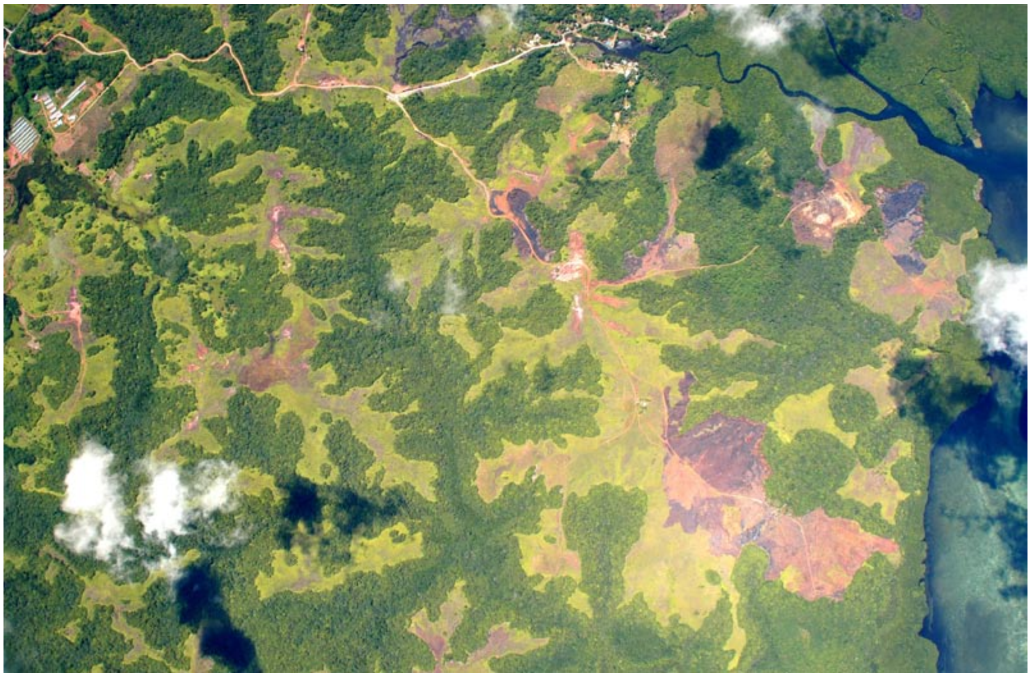

Figure 19.—Volcanic landscapes on Babeldaob Island. The ridges are generally covered with ferns; the hillsides, with either grass or forest species. The higher areas have been cleared of trees, so the dendritic stream drainage pattern is highlighted by a forest cover. The burned areas result from intentionally set fires. Photo courtesy of Dr. Pat Colin, Coral Reef Research Foundation.

Figure 20.—View south toward the southeastern part of Babeldaob Island in Airai State. The foreground of gentle slopes covered with fire-resistant pandanus trees consists of upland volcanic soils (map unit 623, Oxic Dystrudepts, 12 to 50 percent slopes, MLRA 193). The more heavily forested areas on these slopes consist of Aimeliik soils (map units 602 and 603, MLRA 193). The steep limestone hills in the background are mapped as map unit 647 (Peleliu-Chelbacheb-Rock outcrop complex, 80 to 150 percent slopes, MLRA 194). The lowland between the steep limestone hills in the far background includes the Ilachetomel soil in map unit 617, an organic soil that supports mangrove forest (MLRA 193).

Figure 21.—A typical Rock Island limestone landscape southeast of Koror, in MLRA 194. The steep limestone hills are mapped as Peleliu-Chelbacheb-Rock outcrop complex, 80 to 150 percent slopes (map unit 647).

surrounding reef systems and open waters have a wide range of coral, anemones, shellfish, and other marine and pelagic fish species. The average annual rainfall is about 3,685 millimeters (145 inches). The average annual temperature is 27 degrees C (81 degrees F), and there are no frosts. Humidity averages about 90 percent at night and 75 to 80 percent during the day. Typhoons are not common in this area.

Most of this MLRA is a tropical hardwood forest. Low areas along the coast of Angaur and Peleliu Islands are the most productive agricultural lands. Coconut, cassava, breadfruit, betel nut, papaya, bananas, and taro are the principal crops.

MLRA 196, Coral Atolls of Micronesia.—This area consists primarily of coral atolls and some small, low coral islands several hundred miles south of Peleliu. These islands originated as high volcanic islands. Over time, they have been lowered by erosion and tectonic subsidence. Corals grew around the submerged islands, forming atolls and shallow reefs. The average island height is about 2 meters (6 feet), and there are no streams. Fringing reefs surround the islands. The surrounding reef systems and open waters have a wide range of coral, anemones, shellfish, and other marine and pelagic fish species. The average annual rainfall is about 3,000 millimeters (118 inches). The average annual temperature is 27 degrees C (81 degrees F), and there are no frosts. Humidity averages about 90 percent at night and 75 to 80 percent during the day. Typhoons are not common in this area.

These islands commonly have atoll-strand forests on the fringes and agroforestry crops in the interior. Coconut trees cover about 60 percent of the land area. Agroforestry consists of a canopy layer of useful tree species, such as breadfruit, mango, and coconut, and a lower layer of bananas and other garden plants.

Forest Productivity and Management

By Christopher Smith, Robert Gavenda, and John Lawrence, Natural Resources Conservation Service.

Primary forest once covered most the survey area. Some areas have been cleared, but the majority of the land is still covered with dense heterogeneous tropical

forest. The soils under tropical forest may be capable of producing a relatively high, sustained yield of timer if properly managed. In the highly weathered volcanic soils on Babeldaob Island, proper management involves exceptional caution in preserving the forest topsoil, which contains most of the plant nutrients in the soils. The potential for supplying the forest products needed in the survey area is good if fragile forest topsoil can be maintained or improved.

Donnegan et al. (2007) estimated that about 82 percent of their survey area was forest, including agroforest and secondary forest. The area surveyed was from Babeldaob to Angaur. It did not include Kayangel or the Southwest Islands. The survey built on previous forest inventory work by Cole et al. (1987). Nearly all of the woodland is private land, except for small areas of government land at the Nekken Forestry Station and the Ngardok Nature Reserve.

The most common trees in areas of Aimeliik soils on volcanic uplands are *Alphitonia carolinensis*, Calophyllum inophyllum, Calophyllum wakamachi, Parinarium palavensis, and *Pterocarpus indicus*. The most common trees in areas of Nekken soils on volcanic uplands are *Calophyllum inophyllum, Calophyllum wakamachi, Horsfieldia palavensis,* and *Ptercarpus indicus*. Introduced species that are suitable for planting and that have potential for timber production are *Acacia mangium, Pterocarpus indicus, Samanea saman, Swietenia macrophylla, Swietenia mahogany,* and *Swietenia humilis*.

Because the forests on uplands generally support a mixture of several species, thinning of noncommercial vegetation and hand planting of nursery stock commonly are options that can be used to increase stand volume. Periodic clearing of undesirable competing vegetation may be necessary. Adding fertilizer improves the production of most species. Trees in exposed areas, such as those on ridgetops, are subject to windthrow during periods of high winds.

To minimize harvesting costs, windthrown trees that are easily accessible should be cut for timber. The main equipment needed is a portable mill and chainsaw. Production management that protects the soil resource base can be sufficient to provide a good source of income.

Reforestation is needed on the sparsely vegetated Babelthuap and Ngardmau soils and the severely eroded Oxic Dystrudepts, Aquic Dystrudepts, and Typic Udorthents. Because of the droughtiness in the surface layer, trees planted on the Babelthuap and Ngardmau soils, the Typic Udorthents, and the Oxic Dystrudepts should be targeted for reforestation during the rainy season. The Aquic Dystrudepts are suited to trees that are tolerant of wet conditions. Additions of lime (calcium carbonate), synthetic fertilizer, and organic mulch can greatly improve the success of reforestation efforts (fig. 22). Nitrogen-fixing trees were once thought to be able to reclaim degraded lands, but the soils at these sites are generally so poor in nutrients that the trees have difficulty surviving (fig. 23). Ground cover is needed under the trees to prevent excessive erosion (fig. 24).

Further information about management of woodland can be obtained from the Palau Department of Forestry and offices of the U.S. Forest Service in Hilo, Hawaii, and the Natural Resources Conservation Service, Pacific Islands Area West, in Mongmong, Guam.

Forest Productivity

Forest site productivity estimates are made by correlating tree height or diameter with tree age (Donnegan et al., 2007). Lack of consistent annual growth rings in tropical trees, however, complicates estimating forest productivity. No productivity data are presented in this soil survey because of this difficulty.

Site productivity can be severely limited by soil fertility parameters on soils on volcanic uplands. In addition to low inherent fertility and a low capacity to retain plant nutrients, the soils on volcanic uplands and the soils on marine terraces generally have high levels of soluble aluminum, which can be toxic to many plants. Organic matter

Figure 22.—Without sufficient soil amendments, *Acacia* trees about 15 years old on Babelthuap and Ngardmau soils and Typic Udorthents (map unit 614) are struggling to survive. About 5 months before this photo was taken, mulch, lime, and fertilizer were applied around the base of the vigorously growing tree on the left. This site is in the Ngardok Nature Reserve, Melekeok State, Babeldaob Island.

in topsoil is crucial for maintaining soil productivity. These management issues are examined in greater detail in the section “Crops and Pasture.”

Forest Management

Table 3 can be used by woodland owners or forest managers in planning the use of soils for wood crops. It gives interpretive ratings for various aspects of forest management. The ratings are both verbal and numerical.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forest management (1.00) and the point at which the soil feature is not a limitation (0.00).

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. Rating class terms for seedling mortality are expressed as *low, moderate,* and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that little or no erosion is likely; *moderate*

Figure 23.—*Acacia* trees were once thought to be able to reclaim severely degraded sites on Babelthuap and Ngardmau soils and Typic Udorthents (map unit 614). The soil environment is too hostile to the plant and/or the nitrogen-fixing bacteria for the trees to grow vigorously. This site is in Aimeliik State, Babeldaob Island.

Figure 24.—Planting trees without establishing a ground cover can result in excessive erosion. There were no gullies on this site when the trees were planted 10 years ago. The site is in an area of map unit 614 in Aimeliik State, Babeldaob Island.

indicates that some erosion is likely, that the roads or trails may require occasional maintenance; and that simple erosion-control measures are needed; and *severe* or *very severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use. *Well suited* indicates that the soil has favorable features and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has moderately favorable features. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more unfavorable properties. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration.

Recreation

The soils of the survey area are rated in tables 4 and 5 according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 4 and 5 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas and picnic areas in the Republic of Palau occur mainly as areas of Ngedebus soils on several of the Rock Islands and on the island of Peleliu at Honeymoon Beach and as areas of Peleliu soils on the island of Peleliu. They used primarily for picnicking, but a few sites are used for lodges or as camping sites. All of the areas are subject to flooding during typhoons, especially the areas on the island of Peleliu that face the ocean. Because of the flooding, structures should be built on raised post foundations. Ngedebus soils are poorly suited to septic tank absorption

fields because of the hazard of contamination of the adjacent saltwater, especially in areas inside the lagoon.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, depth to bedrock, a high content of organic matter, and large stones. The soil properties that affect the growth of plants are depth to bedrock, permeability, fertility, reaction, available water capacity, sodium content (SAR), salinity (EC), and toxic substances, such as soluble aluminum, in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, depth to bedrock, a high content of organic matter, and large stones. The soil properties that affect the growth of plants are depth to bedrock, permeability, fertility, reaction, available water capacity, sodium content (SAR), salinity (EC), and toxic substances, such as soluble aluminum, in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, depth to bedrock, a high content of organic matter, and large stones. The soil properties that affect the growth of plants are depth to bedrock, permeability, fertility, reaction, available water capacity, sodium content (SAR), salinity (EC), and toxic substances, such as soluble aluminum, in the soil.

Areas of *lawns, landscaping, and golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; fertility; the level of soluble aluminum; depth to a water table; ponding; depth to bedrock; the available water capacity in the upper meter (40 inches); the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings for golf fairways.

Revegetating volcanic soils on uplands and soils on marine terraces can be especially difficult because of very low fertility, a content of high soluble aluminum, and dense or compacted material. The section “Crops” under the heading “Crops and Pasture” describes strategies on how to overcome these limitations.

Paths and trails for hiking and riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, a high content of organic matter, and texture of the surface layer.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 1.5 to 2.1 meters (5 to 7 feet). Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 1.5 to 2.1 meters (5 to 7 feet) of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; locate potential sources of and topsoil and roadfill; plan water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites (fig. 25), including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 6 and 7 show the degree and kind of soil limitations that affect dwellings without basements, small commercial buildings, local roads and streets, and shallow excavations.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.001 to 1.000. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.000) and the point at which the soil feature is not a limitation (0.000).

Dwellings without basements are single-family houses of three stories or less. The foundation is assumed to consist of spread footings of reinforced concrete

Figure 25.—Homesite development exposes the subsoil in an area of map unit 613 (Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 6 to 12 percent slopes). The exposed subsoil cannot be easily stabilized with vegetation because it is highly infertile and can have elevated amounts of soluble aluminum, which is toxic to many plants. This site is in Airai State on Babeldaob Island.

built on undisturbed soil at a depth of 0.6 meter (2 feet) or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock, hardness of bedrock, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 0.6 meter (2 feet). The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock, hardness of bedrock, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock, hardness of bedrock, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), depth to a water table, and ponding. Soils on bottom lands and marine terraces are especially ill-suited to local roads and streets because of wetness and low soil strength.

Shallow excavations are trenches or holes dug to a maximum depth of 1.5 to 1.8 meters (5 or 6 feet) for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock, hardness of bedrock, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Construction Materials

Table 8 gives information about the soils as potential sources of topsoil and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil or roadfill. The lower the number, the greater the limitation.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper meter (40 inches) of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the

soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Sanitary Facilities

Tables 9 and 10 show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.001 to 1.000. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.000) and the point at which the soil feature is not a limitation (0.000).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 0.6 and 1.5 meters (24 and 60 inches) is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock, and flooding affect absorption of the effluent. Stones, boulders, and bedrock interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 1.2 meters (4 feet) below the distribution lines. In these soils the

absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 14 micrometers per second (2 inches per hour) are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 1 meter (40 inches), if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 0.6 meter (2 feet) thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 1.8 meters (6 feet). For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 0.6 meter (2 feet) thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties

include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment

fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics. These results are reported in table R.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 12 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard textural class terms used by the U.S. Department of Agriculture. These terms are defined according to estimated percentages of sand, silt, and clay in the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. Note, however, that iron oxides in the soil cement clay and silt particles into larger aggregates. Because these aggregates are stable in water and cannot be dispersed well, the individual sand, silt, and clay particles are not measured effectively by laboratory methods. For this reason, the field method of estimating USDA texture is used. The field-estimated textures are referred to as “apparent field textures.” The mid-point values of sand, silt, and clay for each textural class are used in this survey when interpretations require percentages of sand, silt, and clay. The values for loam, for example, are 41 percent sand, 41 percent silt, and 18 percent clay. The following chart shows the mid-point values of sand, silt, and clay for each textural class:

Apparent field texture	Percent sand	Percent silt	Percent clay
Clay (C)	20	20	60
Silty clay (SIC)	6	47	47
Silty clay loam (SICL)	10	56	34
Clay loam (CL)	33	33	34
Loam (L)	41	41	18
Silt loam (SIL)	20	65	15
Silt (SI)	8	87	5
Sandy clay (SC)	51	5	44
Sandy clay loam (SCL)	60	13	27
Sandy loam (SL)	65	25	10
Loamy sand (LS)	82	12	6
Sand (S)	90	6	4

If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary. The abbreviations used in the texture column of table 12 are explained in table 13.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 14 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt,

and clay, ranging from the larger to the smaller. Absence of an entry indicates that data were not estimated.

Particle-size distribution measurements are generally not reliable for highly weathered tropical soils because cementation of soil particles into aggregates causes poor laboratory dispersion of the soils and therefore unreliable analysis of particle-size distribution. In this survey area, apparent field textures and the corresponding mid-point values of texture classes were used rather than laboratory data for particle-size analysis. The mid-point values for texture classes are the same as those used in the RUSLE2 program.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 14, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In table 14, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 14, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

15-bar water (moist) refers to the amount of soil water retained at a tension of 15 bars, expressed as a percentage of the ovendry soil weight of the material less than 2 millimeters in size. Water retained at a tension of 15 bars is significant in the determination of the soil water-retention difference, which is used as the initial estimation of available water capacity for some soils. Water retained at 15 bars is an estimation of the wilting point.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$- or $^{1}/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Ksat (saturated hydraulic conductivity) refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity. The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

AWC (available water capacity) refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

LEP (linear extensibility percent) refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Chemical Properties

Table 15 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

A *horizon* is one of various kinds of soil layers. These layers are indicated by horizon designators.

Depth to the upper and lower boundaries of each layer is indicated.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

CEC (cation-exchange capacity) is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

ECEC (effective cation-exchange capacity) refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Sum of bases is the total amount of calcium, magnesium, sodium, and potassium extracted with ammonium acetate buffered at pH 7. The amount of bases is reported as milliequivalents per 100 grams of soil (meq/100g). The bases are essential for plant growth. The term *extractable bases* is used instead of *exchangeable bases* because soluble salts and some bases from carbonates can be included in the extract.

Base saturation is the degree to which material having cation-exchange properties is filled with exchangeable bases (Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Extractable aluminum is the amount of aluminum extracted in 1 normal potassium chloride solution. The KCl-extractable aluminum represents a major constituent in strongly acid soils. Soluble aluminum can stunt plant growth and can even be toxic to plants. Plants vary in their ability to tolerate elevated levels of soluble aluminum. Units of measure are milliequivalents per 100 grams of soil (meq/100g).

Aluminum saturation is calculated by dividing the 1 N KCl-extractable aluminum by ECEC and multiplying by 100. Aluminum saturation is an important indicator of Al-toxicity.

Erosion Properties

Erosion factors are shown in table 16 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Depth to the upper and lower boundaries of each layer is indicated.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. A description of the wind erodibility groups is available in the National Soil Survey Handbook (http://soils.usda.gov/technical/handbook/)

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Soil Laboratory Data

Soil samples are collected during the course of the soil survey and other investigations. Soil properties are ascertained by field examination of the soils and by laboratory analyses of sampled soils. Established standard analytical procedures are followed. The sampled soils from Palau that have been analyzed by the NRCS National Soil Survey Laboratory (NSSL) are listed in table 17. The data can be accessed online at http://ssldata.nrcs.usda.gov/.

Sampled as indicates the name of the soil series indicated when the samples were submitted to the NSSL. A label of “SND” indicates “series not determined.”

User pedon ID is the name of the pedon as identified by the NSSL.

Approved name indicates the name of the soil series to which the pedon was correlated. After an examination of the laboratory data, the soil series name may

be revised and associated with a soil series different from the one named when the sample was submitted.

Map unit symbol is the symbol in the current soil survey of the area where the sample was collected.

Water Features

Table 18 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 18 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 18 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Estimates of the frequency of ponding and flooding in table 18 apply to the whole year rather than to individual months.

Soil Features

Table 19 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, and dense layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Hazard of soil slippage is determined on the basis of features indicating that a mass of soil will possibly slip when vegetation is removed and soil water is at or near saturation or when the slope is undercut. Saturating a slope with water from altered drainage or irrigation affects the hazard of slippage but was not considered in rating the soils. The publication “Landslides Investigation and Mitigation Special Report 247” (Transportation Research Board, National Research Council, 1996) provides additional information about landscape slippage.

Slippage is an important consideration for engineering practices, such as constructing roads and leveling ground for building foundations. In Palau, it is not uncommon for the volcanic rock, even though it has been weathered to saprolite, to have shear zones within the rock. These shear zones may occur at any angle (fig. 26) and cannot be easily detected before slippage occurs. Even before any soil mass has been removed by excavation, slippage has occurred along these shear zones. Movement along the shear zones is evidenced by slickensides, which are polished and grooved surfaces. Slickensides commonly are coated with red iron and black

Figure 26.—Fracture planes characterized by smooth surfaces commonly coated with a red and black sheen (iron and manganese) are randomly oriented in the volcanic rocks on Babeldaob Island. In this photo, two fracture planes meet at a right angle. Removing supporting soil where a fracture plane is oriented downhill is likely to increase the risk of slumping. The vertical exposure in the center of the photo is about 1 meter high.

manganese oxides, which have been deposited as water moves through the shear zone. Shear zones may appear as paper-thin black lines in fresh excavations in volcanic saprolite.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Oxisols.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Perox (*Per*, meaning perudic moisture regime, plus *ox*, from Oxisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Kandiperox (*Kandi*, meaning 1:1 layer silicate clays, plus *perox*, the suborder of the Oxisols that has a perudic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Kandiperox.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is very-fine, halloysitic isohyperthermic Typic Kandiperox.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each major soil recognized in map unit names in the survey area is described. Characteristics of the soil and the material in which it formed are identified

for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (Soil Survey Staff, 1999) and in *Keys to Soil Taxonomy* (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Aimeliik Series

Map units: 601, 600, 611, 604, 603 (fig. 27), 602, 605, 606, 607, 609, 608, 610
Depth class: Very deep
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Hills
Landscape: Volcanic islands
Hillslope position: Backslopes, footslopes, summits, shoulders, toeslopes
Geomorphic position: Crests, nose slopes, interfluves, side slopes, base slopes, head slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Elevation: 1 to 185 meters (3 to 607 feet)
Slope: 2 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, halloysitic, isohyperthermic Typic Kandiperox

Typical pedon

Aimeliik silt loam on an east-by-northeast-facing, convex/linear slope of 65 percent, under a mixed-upland forest plant community, at an elevation of 146 meters (479 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on June 19, 2006, the soil was moist throughout.

Type location.—Ngardmau State, Babeldaob Island, Republic of Palau; from the entrance to Ngardmau Falls, go to the end of the road past the gazebo on the left-hand side. Follow the trail about 18 meters (59 feet) southeast past the outhouse. Then follow the trail into the woods about 10 meters (33 feet) heading northeast for 10 meters (33 feet). Next, go east about 43 meters (141 feet) down an old Japanese WWII road. The soil pit is on the right-hand side up along a hill; 454,431 meters E., 838,598 meters N., UTM zone 53; latitude 7 degrees 35 minutes 11.08 seconds N. and longitude 134 degrees 28 minutes 13 seconds E.; WGS 84.

Oi—0 to 4 centimeters (0 to 1 inch); very dark gray (7.5YR 3/1) slightly decomposed plant material intermixed with a mat of living roots; 80 percent fiber, 50 percent rubbed; massive; nonsticky and nonplastic; many very fine, fine, and medium and few coarse and very coarse roots; many very fine, fine, and medium tubular and interstitial pores; very strongly acid (pH 5.3, 1:1 in water); abrupt smooth boundary. (0 to 15 centimeters thick)

A—4 to 8 centimeters (1 to 3 inches); brown (7.5YR 4/3) silt loam; moderate medium granular structure; very firm, nonsticky and moderately plastic; common very fine, fine, medium, and coarse roots; common very fine, fine, and medium tubular and interstitial pores; common dark brown (10YR 3/3) wormcasts; many fine and medium tubular pores; common thin clay coatings on faces of peds and lining

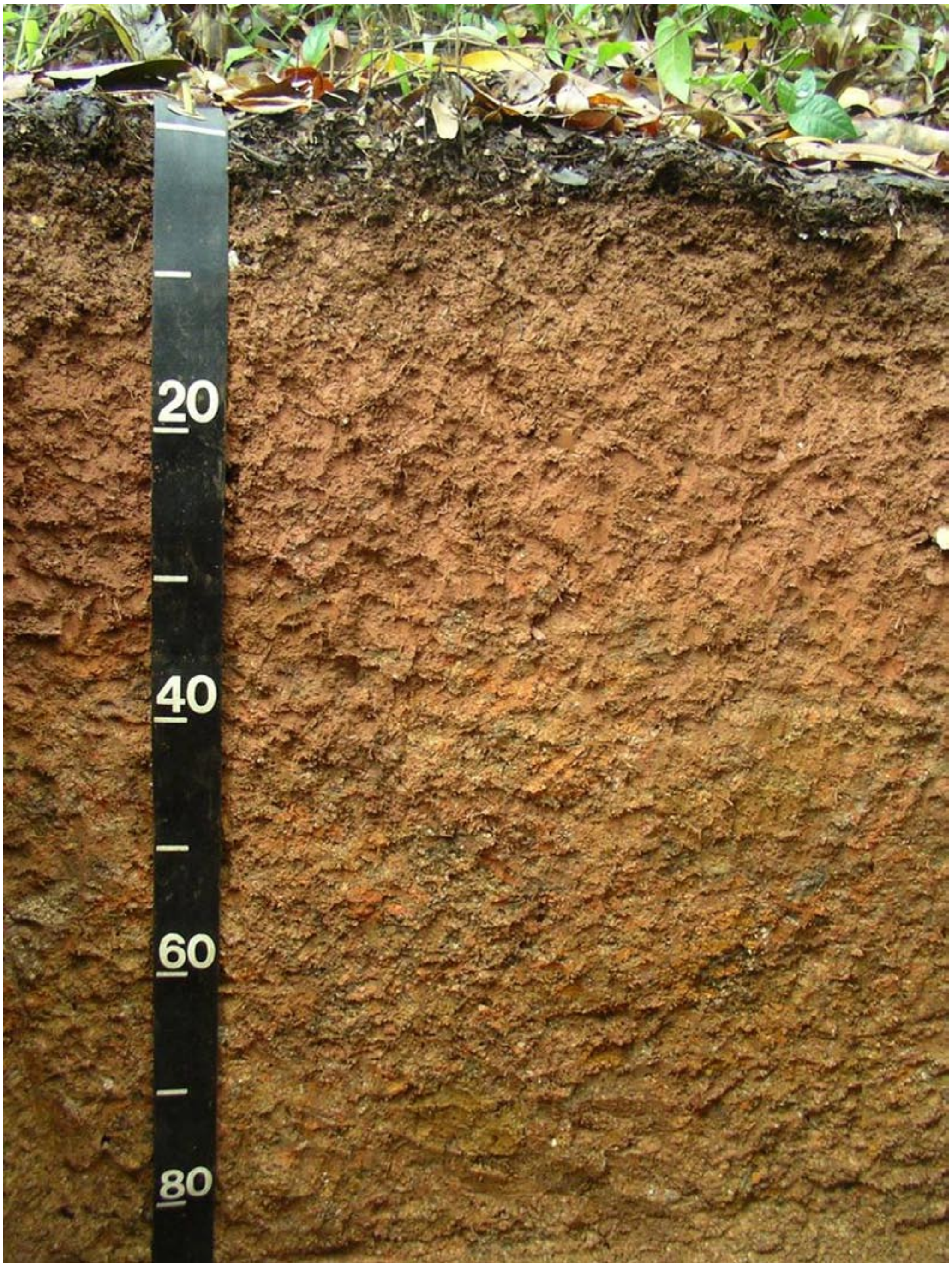

Figure 27.—The Aimeliik series consists of forest soils characterized by relatively fertile topsoil over infertile subsoil. Reddish subsoil (at a depth of about 15 to 35 centimeters in this profile) overlies subsoil that still retains some characteristics of the parent material. The Aimeliik series is one of the most extensive series in Palau. This profile is in an area of map unit 603, Aimeliik silt loam, 30 to 50 percent slopes, in Melekeok State, Babeldaob Island.

pores; very strongly acid (pH 4.9, 1.1 water); abrupt smooth boundary. (8 to 23 centimeters thick); lab sample number 07N00515

Bto1—8 to 33 centimeters (3 to 13 inches); brown (7.5YR 4/4) silty clay loam; strong medium subangular blocky structure parting to moderate very fine and fine angular blocky; firm, nonsticky and very plastic; few very fine, fine, and medium roots;

common very fine, fine, and medium tubular and interstitial pores; common dark brown (10YR 3/3) wormcasts; many fine and medium tubular pores; continuous thin clay coatings on faces of peds and lining pores; few thin black (7.5YR 2/1) manganese coatings on faces of peds; very strongly acid (pH 4.7, 1:1 in water); 35 percent continuous prominent pressure faces on all faces of peds; abrupt smooth boundary. (10 to 71 centimeters thick); lab sample number 07N00516

Bto2—33 to 45 centimeters (13 to 18 inches); strong brown (7.5YR 4/6) silty clay; strong coarse subangular blocky structure; very firm, nonsticky and very plastic; few very fine, fine, and medium roots; common very fine and fine tubular and interstitial pores; common dark brown (10YR 3/3) wormcasts; many fine and medium tubular pores; continuous thin clay coatings on faces of peds and lining pores; very few thin black (7.5YR 2/1) manganese coatings on faces of peds; very strongly acid (pH 4.8, 1:1 in water); 35 percent continuous prominent pressure faces on all faces of peds; gradual wavy boundary. (10 to 20 centimeters thick); lab sample number 07N00517

Bto3—45 to 86 centimeters (18 to 34 inches); strong brown (7.5YR 4/6) clay; strong coarse subangular blocky structure parting to moderate very fine and fine angular blocky; extremely firm, nonsticky and very plastic; few very fine, fine, and medium roots; common very fine and fine tubular and interstitial pores; common dark brown (10YR 3/3) wormcasts; many fine and medium tubular pores; continuous thin clay coatings on faces of peds and lining pores; very few thin black (7.5YR 2/1) manganese coatings on faces of peds; very strongly acid (pH 4.8, 1:1 in water); 60 percent continuous prominent pressure faces on all faces of peds; clear wavy boundary. (10 to 20 centimeters thick); lab sample number 07N00518

CBt—86 to 200 centimeters (34 to 79 inches); variegated 60 percent yellowish red (5YR 4/6) and 25 percent strong brown (7.5YR 4/6) silty clay loam; about 15 percent, by volume, mixed yellowish red (5YR 4/6) and dusky red (10R 3/3) saprolite with a crushed texture of silty clay loam; brown (7.5YR 4/4), weak red (10R 5/2), and pale yellow (5Y 8/2) saprolite occurring as specks or in a platy or variegated color pattern; massive; extremely firm, slightly sticky and very plastic; few very fine, fine, and medium roots in cracks; many very fine and fine and common medium vesicular pores; common thin clay coatings on faces of peds and lining pores; few thin very dark brown (7.5YR 2/2) manganese coatings on faces of peds; very strongly acid (pH 4.9, 1:1 in water.) (0 to 150 centimeters thick); lab sample number 07N00519

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 27 degrees C (81 degrees F)

Linear extensibility: 4 to 11 percent; weighted average, 6 percent

Surface rock fragments: Vesicular petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles

Oi and Oe horizon(s):

Hue—7.5YR or 10YR

Value—2 or 3 moist

Chroma—1 or 2 moist

In lieu texture—slightly decomposed plant material or moderately decomposed plant material

Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles

Reaction—pH of 5.6 to 6.5
Content of organic matter—60 to 70 percent

A and AB horizon(s):
Hue—7.5YR or 10YR
Value—3 or 4 moist
Chroma—3 or 4 moist
Texture—silty clay, silty clay loam, silt loam, or clay
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.7 to 5.4
New Zealand P retention—55 to 65 percent
Aluminum saturation—2 to 22 percent
Content of organic matter—9.0 to 17.0 percent

Bto horizon(s):
Hue—2.5YR, 5YR, or 7.5YR
Value—4 moist
Chroma—4 to 6 moist
Texture—silty clay loam, silty clay, or clay
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.9 to 5.5
New Zealand P retention—60 to 80 percent
Aluminum saturation—75 to 90 percent
Content of organic matter—1 to 3 percent

C, BCt, CBt, and BCt horizon(s):
Hue—10R, 2.5YR, 5YR, 7.5YR, or 10YR
Hue of clay coatings—7.5YR or 10YR
Hue of saprolite—2.5Y, 5GY, or 5Y
Value—3 to 5 moist
Chroma—3 to 8 moist
Value of saprolite—6 to 8 moist
Chroma of saprolite—1 to 3 moist
Texture—silty clay, clay, silty clay loam, or loam
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 5.1 to 5.5
New Zealand P retention—50 to 65 percent
Aluminum saturation—85 to 90 percent
Content of organic matter—0.5 to 0.6 percent

Aquic Dystrudepts

Map units: 650, 652
Depth class: Very deep
Drainage class: Somewhat poorly drained
Most limiting permeability (Ksat): 0.0036-0.036 cm/hr (0.0015-0.014 in/hr); low
Landform: Erosional crests and ridges on hills
Landscape: Volcanic islands
Hillslope position: Backslopes, shoulders, summits
Geomorphic position: Crests, side slopes

Parent material: Interbedded, clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airai Clay Formation
Elevation: 1 to 81 meters (3 to 266 feet)
Slope: 6 to 30 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, halloysitic, isohyperthermic Aquic Dystrudepts

Typical pedon

Aquic Dystrudepts silty clay loam on an east-facing, convex/linear slope of 7 percent, in an area of cropland, at an elevation of 9 meters (30 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on May 4, 2006, the soil was moist throughout. About 10 percent of the surface is covered by gravel consisting of gibbsite concretions. About 65 percent of the surface is bare ground.

Type location.—Airai Municipality, Babelthuap Island, Republic of Palau; about 340 meters (1,120 feet) south-southeast of a pumping station ; 451,015 meters E., 816,039 meters N., UTM zone 53; latitude 7 degrees 22 minutes 56.36 seconds N. and longitude 134 degrees 33 minutes 20.09 seconds E.; WGS 84.

A—0 to 2 centimeters (0 to 1 inch); 70 percent olive brown (2.5Y 4/4) and 30 percent light olive brown (2.5Y 5/4) silty clay loam; moderate fine granular structure over moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; common fine interstitial and tubular and many very fine tubular pores; many fine and medium faint light olive brown (2.5Y 5/4) iron depletions in the matrix; 3 percent quartz fine gravel; extremely acid (pH 4.0, Hellige-Truog); clear smooth boundary. (1 to 10 centimeters thick)

2CBg—2 to 200 centimeters (1 to 79 inches); reddish gray (5YR 5/2) interior clay; 11 percent medium distinct strong brown (7.5YR 5/8) and 11 percent reddish black (7.5R 2.5/1) mottles; weak medium and coarse prismatic structure; firm, moderately sticky and moderately plastic; few very fine and fine roots; common very fine interstitial and tubular pores; common pressure faces on peds; 5 percent black (7.5YR 2/1) lignite pararock gravel; common medium distinct strong brown (7.5YR 5/8) masses of iron in the matrix; extremely acid (pH 4.0; Hellige-Truog); abrupt smooth boundary.

Range in characteristics

Soil moisture regime subclass: Peraquic
Soil moisture regime class: Perudic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.
Mean annual soil temperature: 27 degrees C (81 degrees F)
Control section: 25 to 100 centimeters (10 to 39 inches)
Linear extensibility: 6 to 17 percent; weighted average, 10.6 percent
Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 0 to 25 percent gravel
Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—10 to 16 inches (25 to 40 centimeters)

A horizon(s):
Hue—10YR, 2.5Y, or 5Y
Value—3 or 4 moist

Chroma—2 to 4 moist
Texture—silty clay, silty clay loam, silt loam, or clay
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 10 to 30 percent gravel
Reaction—pH of 3.6 to 5.0
New Zealand P retention—30 to 60 percent
Aluminum saturation—36 to 70 percent
Content of organic matter—3 to 5 percent

2CBg horizon(s):
Hue—2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y
Value—3 to 7 moist
Chroma—1 to 4 moist
Apparent field texture—silty clay, gravelly silty clay, paragravelly silty clay, or very paragravelly silty clay
Size and content of rock fragments—petroferric fragments, lignite, ironstone, and gibbsite concretions; 10 to 30 percent gravel; more than 35 percent pararock fragments in some pedons
Reaction—pH of 2.3 to 3.4
Base saturation—80 to 90 percent
New Zealand P retention—75 to 90 percent
Aluminum saturation—1 to 4 percent
Content of organic matter—0.0 to 0.4 percent

Babelthuap Series

Map units: 612, 613, 614 (fig. 28), 620, 621
Depth class: Very deep
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Erosional crests and ridges on hills
Landscape: Volcanic islands
Hillslope position: Backslopes, shoulders
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Elevation: 4 to 179 meters (13 to 587 feet)
Slope: 2 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, ferruginous, isohyperthermic Typic Kandiperox

Typical pedon

Babelthuap very gravelly loam on a north-by-northeast-facing, convex slope of 10 percent, under a fern-land plant community, at an elevation of 48 meters (157 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on October 1, 1979, the soil was moist throughout.

Type location.—Airai Municipality, Babeldaob Island, Republic of Palau; about 920 meters (3,020 feet) east and 360 meters (1,180) south of the southeast corner of Ngerimel Reservoir dam; 449,037 meters E., 814,859 meters N., UTM zone 53; latitude 7 degrees 22 minutes 17.88 seconds N. and longitude 134 degrees 32 minutes 17.61 seconds E; WGS 84.

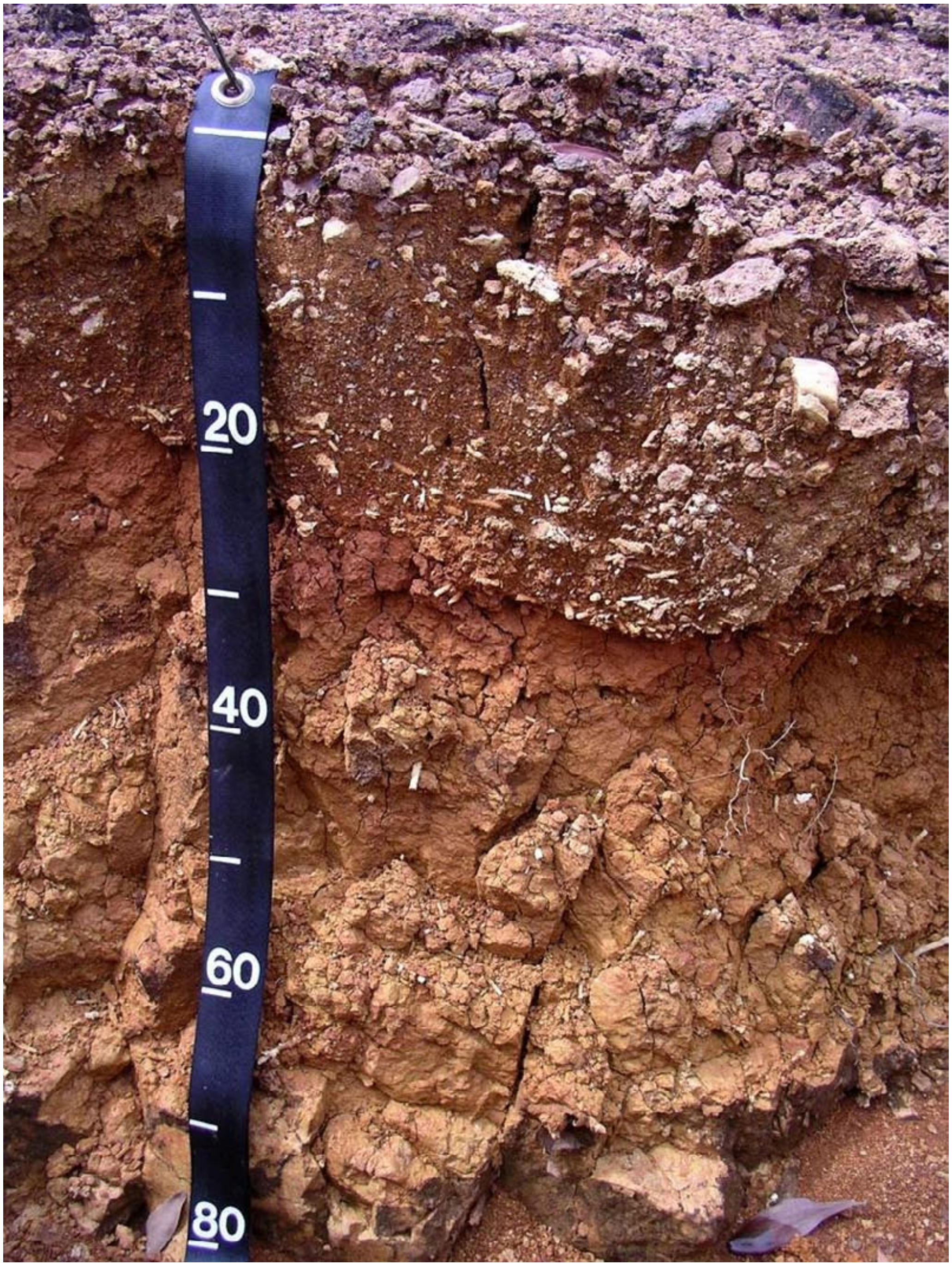

Figure 28.—Babelthuap soils are characterized by very low fertility and a high level of soluble aluminum, which is toxic to most plants. The surface layer generally is gravelly. This profile is in an area of map unit 614, Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes, in Aimeliik State, Babeldaob Island.

About 70 percent of the surface is covered by gravel consisting of petroferric fragments, ironstone, and gibbsite concretions. About 30 percent of the surface is bare ground.

Ac—0 to 10 centimeters (0 to 4 inches); dark reddish brown (5YR 3/4) very gravelly loam, brown (7.5YR 4/4) dry; strong very fine and fine granular structure; hard,

friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine interstitial and common very fine and fine tubular pores; 50 percent gravel (petroferritic fragments and gibbsitic concretions); very strongly acid (pH 4.8, 1:1 in water); clear smooth boundary. (10 to 20 centimeters thick); lab sample number 80P00034

ABc—10 to 28 centimeters (8 to 11 inches); strong brown (7.5YR 4/6) silty clay; moderate medium and coarse subangular blocky structure parting to moderate very fine and fine subangular blocky; firm, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine tubular and interstitial pores; common pressure faces; 10 percent gravel (ironstone fragments); very strongly acid (pH 4.9, 1:1 in water); clear wavy boundary. (15 to 30 centimeters thick); lab sample number 80P00035

Bto—28 to 64 centimeters (11 to 25 inches); dark red (2.5YR 3/6) and yellowish red (5YR 4/6) silty clay; moderate medium and coarse angular blocky structure parting to moderate very fine and fine angular blocky; firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; common thin strong brown (7.5YR 4/6) clay coatings on faces of peds and lining pores; 6 percent gravel (ironstone concretions); very strongly acid (pH 4.9, 1:1 in water); gradual irregular boundary. (25 to 51 centimeters thick); lab sample number 80P00036

CBt—64 to 200 (25 to 78 inches); dark yellowish brown (10YR 3/6) silty clay loam; pinkish gray (7.5YR 6/2) specks; some areas dominated by specks, others by the matrix color; weak medium and thick platy structure parting to moderate fine angular blocky; firm, slightly sticky and slightly plastic; few very fine roots following faces of peds; few very fine tubular pores in peds; common very fine and fine tubular pore clay coatings on peds; many thin and moderately thick strong brown (7.5YR 5/6) coatings on faces of peds and lining pores; 14 percent gravel (petroferric fragments, gibbsite pendants, and ironstone concretions); very strongly acid (pH 4.6, 1:1 in water.); lab sample number 80P00037

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 28 degrees C (83 degrees F)

Restrictive feature: None

Linear extensibility: 3 to 7 percent; weighted average, 4.8 percent

Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 20 to 95 percent total rock fragments; 20 to 80 percent gravel; 0 to 15 percent cobbles

A and AB horizon(s):

Hue—5YR, 7.5YR, or 10YR

Value—3 or 4 moist

Chroma—2 to 4 moist

Texture—silty clay loam, silt loam, silty clay, or the gravelly or very gravelly analogs of those textures

Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 15 to 35 percent total rock fragments; 15 to 35 percent gravel; 0 to 15 percent cobbles

Reaction—pH of 4.7 to 5.1

New Zealand P retention—30 to 45 percent

Aluminum saturation—60 to 75 percent

Content of organic matter—1 to 4 percent

Bto horizon(s):
Hue—10R, 2.5YR, 5YR, or 7.5YR
Value—3 or 4 moist
Chroma—6 moist
Texture—silty clay or silty clay loam
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 5 percent cobbles
Reaction—pH of 5.4 to 5.6
New Zealand P retention—60 to 75 percent
Aluminum saturation—60 to 75 percent
Content of organic matter—0.7 to 2.7 percent

C, BCt, and CBt horizon(s):
Hue—10R, 2.5YR, 5YR, 7.5YR, or 10YR
Hue of clay coatings—7.5YR or 10YR
Hue of saprolite—2.5Y, 5GY, or 5Y
Value—3 to 5 moist
Chroma—3 to 8 moist
Value of saprolite—6 to 8 moist
Chroma of saprolite—1 to 3 moist
Texture—silty clay, clay, silty clay loam, or loam
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 5 percent cobbles
Reaction—pH of 5.1 to 5.5
New Zealand P retention—50 to 65 percent
Aluminum saturation—85 to 90 percent
Content of organic matter—0.5 to 0.6 percent

Chelbacheb Series

Map units: 646, 647
Depth class: Very shallow or shallow
Drainage class: Well drained
Landform: Karrens, karst cones, karst towers, karst valleys
Landscape: Rock islands, raised coralline platform islands
Hillslope position: Toeslopes, footslopes, backslopes, shoulders, summits
Geomorphic position: Base slopes, side slopes
Parent material: Organic material over residuum weathered from coral limestone
Elevation: 2 to 214 meters (7 to 702 feet)
Slope: 6 to 150 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Euic, isohyperthermic Lithic Udifolists

Typical pedon

Chelbacheb highly decomposed plant material on a south-by-southwest-facing, linear/convex slope of 150 percent, under a limestone-forest plant community, at an elevation of 61 meters (200 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on April 20, 2003, the soil was moist throughout.

Type location.—Koror Municipality and Ulebsechel Island, Republic of Palau; on the T-shaped peninsula on the northeast side of the island, proceed east about 34 meters (112 feet) upslope; 443,371 meters E., 809,283 meters N., UTM zone 53; latitude 7 degrees 19 minutes 16.09 seconds N. and longitude 134 degrees 29 minutes 13 seconds E.; WGS 84.

About 50 percent of the surface is covered by gravel, 10 percent by cobbles, and 2 percent by stones. The rock fragments are coralline limestone. The average distance between the stones is 5 meters (16 feet). About 3 percent of the surface is bare ground.

Oa—0 to 20 centimeters (0 to 8 inches); reddish black (10R 2/1); extremely gravelly highly decomposed plant material, about 15 percent fiber rubbed; strong fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine and fine and common medium roots throughout; many very fine and fine dendritic tubular pores; 50 percent gravel, 10 percent cobbles, and 2 percent stones; moderately acid (pH 5.6, 1:1 in water); broken irregular boundary. (10 to 40 centimeters thick); lab sample number 03N03399

2R—20 centimeters (8 inches); coralline limestone with crystal structure apparent in freshly exposed face; white (10YR 8/1) interior; fractured at intervals of 10 centimeters (4 inches) or more; indurated; strongly alkaline (pH 8.6, 1:1 in water).

Range in characteristics

Soil moisture regime class: Perudic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.
Mean annual soil temperature: 27 degrees C (81 degrees F)
Depth to lithic contact: 10 to 30 centimeters (4 to 12 inches)
Linear extensibility: 0 to 1 percent; weighted average, 0.5 percent
Surface rock fragments: Strongly cemented angular coralline limestone; 35 to 90 percent total rock fragments; 10 to 50 percent gravel; 10 to 80 percent cobbles; 5 to 15 percent stones; 0 to 10 percent boulders; the average distance between stones is about 5 meters (16 feet), and that between boulders is about 15 meters (49 feet.)

Oa horizon(s):
Hue: 7.5YR or 10YR
Value: 2 or 3 moist
Chroma: 1 or 2 moist
Texture: Extremely cobbly highly decomposed plant material, extremely gravelly highly decomposed plant material, or very cobbly highly decomposed plant material
Size and content of rock fragments—hard, angular coralline limestone and strongly cemented angular coralline limestone; 35 to 90 percent total rock fragments; 10 to 50 percent gravel; 10 to 80 percent cobbles; 5 to 15 percent stones; 0 to 10 percent boulders
Calcium carbonate equivalent: 0 to 4 percent
Reaction: PH of 5.4 to 5.8
Content of organic matter: 70 to 80 percent

Chia Series

Map unit: 615
Depth class: Very deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): 3.6-36 cm/hr (1.42-14.17 in/hr); high
Landform: Intertidal zone of tidal marshes, mangrove swamps, salt marshes

Landscape: Areas adjacent to atolls, karst, and limestone islands
Geomorphic position: Talf
Parent material: Organic deposits derived dominantly from decomposing mangrove roots and litter over water-deposited coralline sand and gravel
Elevation: -1 to 4 meters (-3 to 13 feet)
Slope: 0 to 1 percent

Climatic data
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Sandy or sandy-skeletal, carbonatic, euic, isohyperthermic Terric Sulfihemists

Typical pedon

Chia mucky peat in a level area of a coralline mangrove forest plant community, at an elevation of 0.5 meter (1.6 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on September 15, 1980, the soil was wet throughout and had a water table at a depth of 20 centimeters (8 inches) because of fluctuating tides.

Type location.—Island of Moen (Weno), Chuuk State, Federated States of Micronesia; about 200 meters (656 feet) south of Epinup Village; 374,641 meters E., 821,660 meters N., UTM zone 56; latitude 7 degrees 25 minutes 55 seconds N. and longitude 151 degrees 51 minutes 50.5 seconds E., WGS 84.

Oi1—0 to 23 centimeters (0 to 9 inches); black (5YR 2.5/1) peat; about 65 percent fiber, 45 percent rubbed; massive; firm; common medium and few coarse roots; color in pyrophosphate solution is very pale brown (10YR 8/2); slight odor of sulfur; slightly acid (pH 6.5, in situ in water); clear smooth boundary.

Oi2—23 to 51 centimeters (9 to 20 inches); dark reddish brown (5YR 2.5/2) peat; about 70 percent fiber, 60 percent rubbed; massive; firm; common medium and few coarse roots; color in pyrophosphate solution is very pale brown (10YR 8/2); moderate odor of sulfur; neutral (pH 7.0, 1:1 in water in place); clear smooth boundary.

Oi3—51 to 74 centimeters (20 to 29 inches); very dark grayish brown (10YR 3/2) peat with about 20 percent very pale brown (10YR 8/3) uncoated sand grains; about 80 percent fiber, 70 percent rubbed; massive; friable; few medium roots; color in pyrophosphate solution is very pale brown (10YR 8/2); strong odor of sulfur; about 20 percent mineral material; neutral (pH 7.1, 1:1 in water in place); abrupt smooth boundary. (Combined thickness of the Oi horizons is 50 to 129 centimeters.)

2C1—74 to 94 centimeters (29 to 37 inches); dark grayish brown (10YR 4/2) gravelly loamy sand with very pale brown (10YR 8/3) uncoated sand grains; single grain; friable; many very fine interstitial pores; moderate odor of sulfur; 20 percent gravel (coral limestone); neutral (pH 7.2, 1:1 in water in place); clear smooth boundary.

2C2—94 to 150 centimeters (37 to 59 inches); dark grayish brown (10YR 4/2) very gravelly loamy sand with very pale brown (10YR 8/3) uncoated sand grains; single grain; friable; many very fine interstitial pores; moderate odor of sulfur; 36 percent gravel (coral limestone); strongly effervescent; slightly alkaline (pH 7.4 in situ in water). (Combined thickness of the 2C horizons is 20 to 100 centimeters.)

Range in characteristics

Soil moisture regime class: Aquic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months. The soils are flooded semi-diurnally with saltwater during periods of high tide.

Linear extensibility: 0 to 1 percent; weighted average, 0.5 percent
Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—0 to 25 centimeters (0 to 10 inches)

O horizon(s):
Hue: 2 or 3 moist
Value: 2 or 3 moist
Chroma: 1 or 2 moist
Texture: Peat
Content of clay: 0 to 15 percent
Size and content of rock fragments: 0 to 5 percent total limestone gravel
Calcium carbonate equivalent: 0 to 5 percent
Electrical conductivity: 5 to 30 mmhos/cm
Sodium adsorption ratio: 0 to 5
Reaction: PH of 6.1 to 7.3
Content of organic matter: 70 to 90 percent

C horizon(s):
Hue: 10YR
Value: 7 or 8 moist
Chroma: 2 or 3 moist
Texture: Loamy sand, sand, or the gravelly or very gravelly analogs of those textures
Content of clay: 0 to 15 percent
Size and content of rock fragments—coralline limestone; 15 to 60 percent total rock fragments; 5 to 50 percent gravel; 0 to 10 percent cobbles
Calcium carbonate equivalent: 95 to 98 percent
Electrical conductivity: 10 to 20 mmhos/cm
Sodium adsorption ratio: 0 to 2
Reaction: PH of 7.0 to 7.8
Content of organic matter: 0 to 3 percent

Dechel Series

Map units: 616 (fig. 29), 618
Depth class: Very deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Landscape: Volcanic islands
Geomorphic position: Treads, talf
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Elevation: 0 to 67 meters (0 to 220 feet)
Slope: 0 to 2 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, mixed, semiactive, acid, isohyperthermic Fluvaquentic Endoaquepts

Typical pedon

Dechel silty clay on a level flood plain under wetland taro cultivation, at an elevation of 5 meters (16 feet). Colors are for moist soil. All textures are apparent field textures.

Figure 29.—Profile of Dechel silty clay, 0 to 2 percent slopes (map unit 616). This is a bottom-land soil with a high water table. Wet soil conditions are indicated by the gray soil matrix and the oxidized (rust-colored) root channels. This site is in the Ngerikiil Valley, Airai State, Babeldaob Island.

When described on April 24, 2003, the soil had a water table at a depth of 33 centimeters.

Type location.—Airai Municipality, Babeldaob Island, Republic of Palau: from the north end of the Compact Road bridge crossing the Ngerikiil River, travel 166 meters (545 feet) north-northwest to a driveway leading to a house; from the road, walk 60 meters (197 feet) southwest behind the house to a berm along a taro patch; walk 100 meters (328 feet) southeast along the berm; turn to the northeast and walk 2 meters to the pit location; 450,890 meters E., 815,554 meters N., UTM zone 53; latitude 7 degrees 22 minutes 40.56 seconds N. and longitude 134 degrees 33 minutes 18.03 seconds E.; WGS 84.

A—0 to 6 centimeters (0 to 2 inches); very dark grayish brown (10YR 3/2) silty clay; weak medium subangular blocky structure parting to moderate very fine subangular blocky; firm, moderately sticky and very plastic; common very fine and fine and common medium roots throughout; common very fine and fine tubular pores; strongly acid (pH 5.5, 1:1 in water); abrupt smooth boundary. (5 to 10 centimeters thick); lab sample number 03N03391

2Bg—6 to 18 centimeters (2 to 7 inches); weak red (2.5YR 5/2) clay; moderate medium subangular blocky structure parting to strong very fine subangular blocky; firm, very sticky and moderately plastic; common very fine and fine and common medium roots throughout; common very fine and fine tubular pores; 90 percent continuous distinct very dark grayish brown (10YR 3/2) organic stains; 4 percent medium prominent irregular strongly cemented dark reddish brown (2.5YR 2.5/4) iron-manganese masses on faces of peds and 6 percent medium prominent irregular strongly cemented yellowish red (5YR 5/8) iron-manganese masses on surfaces along pores; (pH 5.5, 1:1 in water); abrupt wavy boundary. (5 to 25 centimeters thick); lab sample number 03N03392

3Cg—18 to 200 centimeters (7 to 79 inches); very dark grayish brown (10YR 3/2) clay; weak coarse prismatic structure parting to moderate coarse angular blocky; firm, very sticky and moderately plastic; common very fine and fine and common medium roots throughout; common fine and common very fine dendritic tubular pores; 5 percent fine distinct irregular strongly cemented iron-manganese masses in the matrix and 15 percent fine prominent irregular strongly cemented strong brown (7.5YR 5/6) iron-manganese masses infused into matrix adjacent to pores; very strongly acid (pH 5.0; 1:1 in water). (170 to 230 centimeters thick); lab sample number 03N03393

Range in characteristics

Soil moisture regime class: Aquic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.
Mean annual soil temperature: 27 degrees C (81 degrees F)
Linear extensibility: 1 to 3 percent; weighted average, 1.7 percent
Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—0 to 25 centimeters (0 to 4 inches)

A horizon(s):
Hue: 10YR, 2.5Y, 5Y, 5G, or 5GY
Value: 3 to 5 moist
Chroma: 1 or 2 moist
Texture: Silty clay, silt loam, or mucky silt loam
Reaction: PH of 4.5 to 5.6
Aluminum saturation—25 to 55 percent
New Zealand P retention—60 to 80 percent
Content of organic matter: 3 to 9 percent

2Bg horizon(s):
Hue: 10YR, 2.5Y, 5Y, 5G, or 5GY
Value: 3 to 5 moist
Chroma: 1 or 2 moist
Texture: Clay or silty clay loam
Size and content of rock fragments: Strata of rock fragments in some pedons, including petroferric fragments, gibbsitic concretions, and schist; 0 to 45 percent total rock fragments; 0 to 45 percent gravel; 0 to 5 percent cobbles
Reaction: PH of 4.5 to 5.5
Aluminum saturation—25 to 55 percent
New Zealand P retention—60 to 80 percent
Content of organic matter: 3.5 to 7.5 percent

3Cg horizon(s):
Hue: 10YR, 5BG, 5GY, 2.5Y, or 5Y
Value: 2.5 to 5
Chroma: 1 to 3
Texture: Clay or silty clay loam
Size and content of rock fragments: Strata of rock fragments in some pedons, including petroferric fragments, gibbsitic concretions, and schist; 0 to 15 percent total rock fragments; 0 to 15 percent gravel
Reaction: PH of 3.4 to 5.5
Aluminum saturation—25 to 55 percent
New Zealand P retention—60 to 80 percent
Content of organic matter: 2.0 to 6.0 percent

Ilachetomel Series

Map unit: 617
Depth class: Very deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Landform: Intertidal zone of mangrove swamps, salt marshes, and tidal marshes
Landscape: Shoreline of volcanic islands
Geomorphic position: Talf
Parent material: Organic deposits derived dominantly from decomposing mangrove roots and litter
Elevation: -1 to 4 meters (-3 to 13 feet)
Slope: 0 to 1 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Euic, isohyperthermic Typic Sulfihemists

Typical pedon

Ilachetomel peat in a level area of a volcanic mangrove tidal forest plant community, at an elevation of 0.5 meter (1.6 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When the soil was described on December 16, 1979, the water table was 10 centimeters (4 inches) above the soil surface because of semidiurnal tides.

Type location.—Aimeliik Municipality, Babeldaob Island, Republic of Palau; about 27 meters (88 feet) west of the first land fall up a channel through mangroves leading to the Dabador area in Aimeliik, then about 5 meters (16 feet) north into mangroves; 445,780 meters E., 818,773 meters N., UTM zone 53; latitude 7 degrees 24 minutes 25.11 seconds N. and longitude 134 degrees 30 minutes 31.22 seconds E.; WGS 84.

Oi1—0 to 20 centimeters (0 to 8 inches); black (10YR 2/1) peat; about 70 percent fiber rubbed; weak fine and medium subangular blocky structure; many very fine and fine and few medium roots; common very fine interstitial pores; moderate odor of sulfur; moderately acid (pH 6.0, in calcium chloride); clear smooth boundary.

Oi2—20 to 41 centimeters (8 to 16 inches); very dark grayish brown (10YR 3/2) peat; about 70 percent fiber rubbed; weak fine and medium subangular blocky structure; many very fine and fine and few medium roots; common very fine interstitial pores; slight odor of sulfur; common medium and coarse decomposing roots; moderately acid (pH 6.0, in calcium chloride); gradual smooth boundary. (Combined thickness of the Oi1 and Oi2 horizons is 10 to 100 centimeters.)

Oi3—41 to 81 centimeters (16 to 32 inches); very dark grayish brown (10YR 3/2) peat; about 55 percent fiber rubbed; weak fine and medium subangular blocky structure; many very fine and fine, few medium, and common coarse roots; common very fine interstitial pores; slight odor of sulfur; common medium and coarse decomposing roots; moderately acid (pH 5.6, in calcium chloride); gradual smooth boundary.

Oi4—81 to 150 centimeters (32 to 59 inches); very dark grayish brown (10YR 3/2) mucky peat; about 42 percent fiber rubbed; weak medium and coarse subangular blocky structure; many very fine and fine, few medium, and common coarse roots; common very fine interstitial pores; moderately acid (pH 5.8, in calcium chloride). (Combined thickness of the Oi3 and Oi4 horizons is 50 to 140 centimeters.)

Range in characteristics

Soil moisture regime class: Aquic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months. The soils are flooded semi-diurnally with ocean saltwater during periods of high tide. The level of ponding is as much as 30 centimeters (12 inches) above the surface, and the water table is as much as 30 centimeters (12 inches) below the surface.
Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—0 to 30 centimeters (0 to 12 inches)

Oi horizon(s):
Hue: 2 or 3 moist
Value: 2 or 3 moist
Chroma: 1 or 2 moist
Texture: Peat
Content of fiber (rubbed)—40 to 85 percent
Size and content of rock fragments—mixed; 0 to 5 percent gravel
Electrical conductivity: 5 to 30 mmhos/cm
Sodium adsorption ratio: 0 to 5
Reaction: PH of 3.2 to 5.0
Content of organic matter: 70 to 90 percent

Insak Series

Map unit: 615
Depth class: Moderately deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): 3.6-36 cm/hr (1.42-14.17 in/hr); high
Landform: Areas of brackish water adjacent to shores, tidal marshes, mangrove swamps, salt marshes
Landscape: Shorelines of limestone islands; atolls, areas of karst
Geomorphic position: Talf
Parent material: Organic material and sandy material derived from coral limestone
Elevation: -1 to 4 meters (-3 to 13 feet)
Slope: 0 to 1 percent

Climatic data
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Carbonatic, isohyperthermic Mollic Psammaquents

Typical pedon

Insak peaty loamy sand in a level area of a coralline-mangrove forest plant community, at an elevation of 0.5 meter (1.6 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on March 3, 1980, the soil was wet throughout and had a water table at a depth of 13 centimeters (5 inches) because of fluctuating tides.

Type location.—Island of Kosrae, Federated States of Micronesia; about 2.9 kilometers (1.8 miles) north of Malem and 30 meters (98 feet) east of the main road; latitude 5 degrees 18 minutes 28 seconds N. and longitude 163 degrees 1 minutes 58 seconds E.

A—0 to 8 centimeters (0 to 3 inches); very dark grayish brown (10YR 3/2) peaty loamy sand; massive; friable, nonsticky and nonplastic; many fine and very fine roots;

many very fine interstitial pores; moderately alkaline (pH 8.0, 1:1 in water); abrupt smooth boundary. (5 to 10 centimeters thick)

AC—8 to 18 centimeters (3 to 7 inches); dark brown (10YR 3/3) mucky loamy sand; massive; friable, nonsticky and nonplastic; many fine and very fine roots; many very fine tubular pores; moderately alkaline (pH 8.0, 1:1 in water); gradual smooth boundary. (5 to 13 centimeters thick)

C1—18 to 46 centimeters (7 to 18 inches); dark yellowish brown (10YR 3/4) mucky loamy sand; single grain; loose; many fine and very fine and few coarse roots; common very fine tubular pores; moderately alkaline (pH 8.0, 1:1 in water); gradual smooth boundary. (20 to 41 centimeters thick)

C2—46 to 74 centimeters (18 to 29 inches); dark yellowish brown (10YR 3/4) gravelly loamy sand; single grain; loose; common fine and very fine roots; common very fine tubular pores; about 25 percent coral gravel; moderately alkaline (pH 8.0, 1:1 in water). (20 to 41 centimeters thick)

R—74 centimeters (29 inches); coralline limestone with crystal structure apparent in freshly exposed face; white (10YR 8/1) interior; fractured at intervals of 10 centimeters (4 inches) or more; indurated; strongly alkaline (pH 8.6, 1:1 in water).

Range in characteristics

Soil moisture regime class: Aquic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months. The soils are flooded daily with ocean saltwater during periods of high tide.

Linear extensibility: 0 to 1 percent; weighted average, 0.5 percent

Surface rock fragments: Basalt, tuff, ironstone, and gibbsite concretions; 0 to 10 percent total rock fragments; 0 to 10 percent gravel; 0 to 10 percent cobbles

Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—0 to 20 centimeters (0 to 8 inches)

A horizon(s):

Hue—10YR
Value—4 to 5 moist
Chroma—2 moist
Texture—peaty loamy sand
Size and content of rock fragments—coralline limestone; 0 to 15 percent total rock fragments; 0 to 10 percent gravel; 0 to 5 percent cobbles.
Calcium carbonate equivalent—70 to 95 percent
Electrical conductivity—15 to 30 mmhos/cm
Sodium adsorption ratio—0 to 10
Reaction—pH of 7.4 to 8.4
Content of organic matter—15.0 to 25.0 percent

C horizon(s):

Hue—10YR
Value—3 to 5
Chroma—4
Texture—loamy sand, gravelly loamy sand, or mucky loamy sand
Size and content of rock fragments—coralline limestone; 0 to 30 percent total rock fragments; 0 to 10 percent gravel; 0 to 5 percent cobbles.
Calcium carbonate equivalent—95 to 98 percent
Electrical conductivity—15 to 30 mmhos/cm
Sodium adsorption ratio—0 to 2
Reaction—pH of 7.4 to 8.4
Content of organic matter—2.0 to 8.0 percent

Majuro Series

Map unit: 629
Depth class: Very deep
Drainage class: Somewhat excessively drained
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Landform: Back-barrier flats, beach terraces, beach ridges, beaches, generally on oceanside of atolls
Landscape: Barrier islands, atolls, limestone islands, areas of karst
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Parent material: Water- and wind-deposited coralline rubble and sand
Elevation: 0 to 7 meters (0 to 23 feet)
Slope: 2 to 6 percent

Climatic data
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Sandy-skeletal, carbonatic, isohyperthermic Typic Udorthents

Typical pedon

Majuro very cobbly loamy sand on a southeast-facing, linear slope of 1 percent, in a *Casuarina* and atoll forest plant community, at an elevation of 1 meter (3.3 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on April 1, 1979, the soil was moist throughout.

Type location.—Mili Island, Mili Atoll in the Republic of the Marshall Islands; about 1,295 meters (4,250 feet) south of the northern tip of Mili Island and 24 meters (80 feet) east of the oceanside; 580,685 meters E., 673,392 meters N., UTM zone 59; latitude 6 degrees 5 minutes 30 seconds N. and longitude 171 degrees 43 minutes 45 seconds E.; WGS 84.

A—0 to 15 centimeters (0 to 6 inches); grayish brown (10YR 5/2) very cobbly loamy sand; weak medium angular blocky structure; very friable, nonsticky and nonplastic; common fine and medium roots; many fine interstitial pores; strongly effervescent; rock fragments occurring as coralline limestone; 10 percent gravel and 30 percent cobbles; moderately alkaline (pH 8.0); abrupt wavy boundary. (10 to 25 centimeters thick)
AC—15 to 32 centimeters (6 to 13 inches); pale brown (10YR 6/3) very cobbly loamy sand; single grain; loose, nonsticky and nonplastic; common fine and medium roots; many fine interstitial pores; strongly effervescent; rock fragments occurring as coralline limestone; 10 percent gravel and 30 percent cobbles; moderately alkaline (pH 8.0); gradual wavy boundary. (10 to 20 centimeters thick)
C1—32 to 62 centimeters (13 to 24 inches); very pale brown (10YR 7/3) very cobbly sand; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many fine interstitial pores; strongly effervescent; rock fragments occurring as coralline limestone; 15 percent gravel and 40 percent cobbles; moderately alkaline (pH 8.2); gradual smooth boundary. (20 to 50 centimeters thick)
C2—62 to 200 centimeters (24 to 79 inches); very pale brown (10YR 8/3) very gravelly sand; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; strongly effervescent; rock fragments occurring as coralline limestone; 10 percent gravel and 30 percent cobbles; moderately alkaline (pH 8.2).

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.
Mean annual soil temperature: 27 degrees C (81 degrees F)
Control section: 25 to 100 centimeters (10 to 39 inches)
Thickness of the solum: 50 to 100 centimeters (20 to 39 inches)
Surface rock fragments: Hard, angular coralline limestone; 60 to 90 percent total rock fragments; 30 to 50 percent gravel; 30 to 40 percent cobbles
Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—100 to 150 centimeters (39 to 59 inches)

Oi horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 or 2
In lieu texture—slightly decomposed plant material that is extremely cobbly or very cobbly
Size and content of rock fragments—hard, subrounded coralline limestone; 35 to 90 percent total rock fragments; 25 to 40 percent gravel; 15 to 35 coarse cobbles; 0 to 15 percent stones
Electrical conductivity—0 to 5 mmhos/cm
Reaction—neutral to slightly alkaline
Content of organic matter—60.0 to 100.0 percent

A horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 or 2
Texture—sand or loamy sand that is extremely cobbly or very cobbly
Size and content of rock fragments—hard, subrounded coralline limestone; 35 to 90 percent total rock fragments; 25 to 40 percent gravel; 15 to 35 coarse cobbles; 0 to 15 percent stones
Calcium carbonate equivalent—70 to 95 percent
Electrical conductivity—0 to 2 mmhos/cm
Reaction—pH of 7.0 to 7.8
Content of organic matter—4 to 13 percent

AC horizon(s):
Hue—7.5YR or 10YR
Value—4 to 8
Chroma—2 to 5
Texture—sand or loamy sand that is extremely cobbly or very cobbly
Size and content of rock fragments—hard, subrounded coralline limestone; 35 to 90 percent total rock fragments; 25 to 40 percent gravel; 15 to 35 coarse cobbles; 0 to 15 percent stones
Calcium carbonate equivalent—90 to 98 percent
Electrical conductivity—0 to 2 mmhos/cm
Reaction—pH of 7.8 to 8.3
Content of organic matter—0 to 0.5 percent

C horizon(s):
Hue—7.5YR or 10YR
Value—4 to 8 moist
Chroma—2 to 4 moist
Texture—sand or loamy sand that is extremely cobbly or very cobbly

Size and content of rock fragments—hard, subrounded coralline limestone; 35 to 90 percent total rock fragments; 25 to 40 percent gravel; 15 to 35 coarse cobbles; 0 to 15 percent stones
Calcium carbonate equivalent—90 to 98 percent
Reaction—slightly alkaline or moderately alkaline
Content of organic matter—0 to 0.1 percent

Mesei Series

Map unit: 618
Depth class: Very deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Backswamps, marshes, stream terraces, swamps, valley floors
Landscape: Volcanic islands
Geomorphic position: Treads, talf
Parent material: Organic material over alluvium derived basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Elevation: 0 to 71 meters (0 to 233 feet)
Slope: 0 to 1 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Clayey, mixed, euic, isohyperthermic Terric Haplosaprists

Typical pedon

Mesei muck in a level area of a wetland taro, hydrophytic grasses, sedges, and swamp-forest plant community. Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When the soil was described on September 12, 2006, the water table was 10 centimeters (4 inches) below the soil surface.

Type location.—Babeldaob Island, Aimeliik State; Republic of Palau; about 402 meters (1,320 feet) along the main road southeast of the Y intersection of the main road and a road leading to Ngchemiangel; proceed 34 meters (112 feet) southwest along a trail to a taro patch; 443,653 meters E., 823,359 meters N., UTM zone 53; latitude 7 degrees 26 minutes 54.47 seconds N. and longitude 134 degrees 29 minutes 21.67 seconds E.; WGS 84.

Oa1—0 to 13 centimeters (0 to 5 inches); dark brown (7.5YR 3/2) sapric material; about 30 percent fiber, 0 percent rubbed; massive; nonsticky and slightly plastic; many very fine, fine, and medium roots; many very fine and fine tubular pores; color is 10YR 7/2 in pyrophosphate solution; very strongly acid (pH 4.5, in calcium chloride); clear smooth boundary. (10 to 30 centimeters thick)
Oa2—13 to 41 centimeters (5 to 16 inches); very dark grayish brown (10YR 3/2) sapric material; about 24 percent fiber, 4 percent rubbed; weak coarse subangular blocky structure; nonsticky and slightly plastic; many very fine and fine and common medium roots; many very fine and fine tubular pores; color is 10YR 6/3 in pyrophosphate solution; strongly acid (pH 5.3, in calcium chloride); gradual wavy boundary. (20 to 51 centimeters thick)
Oa3—41 to 86 centimeters (16 to 34 inches); very dark grayish brown (10YR 3/2) sapric material; about 29 percent fiber, 1 percent rubbed; weak medium and coarse subangular blocky structure; nonsticky and slightly plastic; many very fine and fine roots; many very fine and fine tubular and common fine interstitial pores; color is 10YR 6/3 in pyrophosphate solution; strongly acid (pH 5.4, in calcium chloride); abrupt smooth boundary. (33 to 51 centimeters thick)

2Cg—86 to 200 centimeters (34 to 79 inches); dark gray (10YR 4/1) mucky silt loam; massive; slightly sticky and slightly plastic; common very fine roots; many very fine and fine tubular pores; about 5 percent, by volume, plant fibers; slightly acid (pH 6.2, 1:1 in water); abrupt smooth boundary. (51 to 84 centimeters thick)

Range in characteristics

Soil moisture regime class: Aquic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months. The level of ponding is as much as 30 centimeters (12 inches) above the surface, and the water table is as much as 15 (6 inches) centimeters below the surface.
Mean annual soil temperature: 27 degrees C (81 degrees F)
Control section: 25 to 100 centimeters (10 to 39 inches)
N value: More than 0.7
Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—0 to 15 centimeters (0 to 6 inches)

Oa horizon(s):
Hue—7.5YR or 10YR
Value—2 to 4 moist
Chroma—1 to 3 moist
In lieu texture—muck
Content of fiber (rubbed)—5 to 17 percent
Reaction—pH of 4.5 to 5.5
Aluminum saturation—0 to 3 percent
Content of organic matter—20 to 80 percent

2Cg horizon(s):
Hue—10YR, 2.5YR, 5Y
Value—4 to 6 moist
Chroma—0 to 2 moist
Texture—silt loam, silt clay loam, or silty clay
Content of rock fragments—0 to 10 percent gravel
Reaction—pH of 3.5 to 4.5
Aluminum saturation—15 to 28 percent
Content of organic matter—5 to 15 percent

Naniak Series

Map unit: 617
Depth class: Very deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Areas of brackish water adjacent to shores, salt marshes, mangrove swamps, tidal marshes
Landscape: Volcanic islands
Geomorphic position: Dips
Parent material: Organic deposits and alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Elevation: -1 to 4 meters (-3 to 13 feet)
Slope: 0 to 1 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Fine-loamy, mixed, superactive, acid, isohyperthermic Typic Sulfaquents

Typical pedon

Naniak mucky silt loam in a level area of a volcanic-mangrove forest plant community, at an elevation of 0.5 meter (1.6 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on July 15, 1979, the soil was wet throughout and had a water table at a depth of 15 centimeters (6 inches) because of fluctuating tides. About 10 percent the surface is covered by gravel consisting of indurated, subrounded basalt. About 25 percent of the surface is bare ground.

Type location.—Island of Pohnpei, Federated States of Micronesia, Kitti Municipality, Pehleng Village; about 48 meters (157 feet) northwest of the boathouse in the lot of Reikapw; latitude 6 degrees 52 minutes 3 seconds N. and longitude 158 degrees 9 minutes 8 seconds E.

A—0 to 15 centimeters (0 to 6 inches); black (10YR 2/1) mucky silt loam; massive; nonsticky and nonplastic; few coarse and very coarse roots; common fine tubular pores; about 10 percent basalt gravel; neutral (pH 6.7, 1:1 in water in place); gradual smooth boundary. (10 to 41 centimeters thick)

Cg1—15 to 30 centimeters (6 to 12 inches); black (10YR 2/1) mucky silt loam; massive; nonsticky and nonplastic; few coarse and very coarse roots; common fine tubular pores; very fluid; sulfurous odor; about 5 percent basalt gravel; slightly acid (pH 6.4, 1:1 in water in place); gradual smooth boundary. (0 to 30 centimeters thick)

Cg2—30 to 46 centimeters (12 to 18 inches); black (10YR 2/1) mucky loam; massive; slightly sticky and nonplastic; few coarse roots; common fine tubular pores; very fluid; sulfurous odor; 5 percent basalt gravel; slightly acid (pH 6.2, 1:1 in water in place); gradual smooth boundary. (5 to 20 centimeters thick)

Cg3—46 to 61 centimeters (18 to 24 inches); very dark gray (10YR 3/1) mucky loam; massive; slightly sticky and nonplastic; very fluid; sulfurous odor; 10 percent basalt gravel; slightly acid (pH 6.5, 1:1 in water in place); gradual smooth boundary. (10 to 50 centimeters thick)

2Cg4—61 to 127 centimeters (24 to 50 inches); black (5Y 2.5/1) gravelly loam; massive; slightly sticky and slightly plastic; sulfurous odor; 25 percent basalt gravel; slightly acid (pH 6.4, 1:1 in water in place); gradual smooth boundary (0 to 100 centimeters thick)

2Cg5—127 to 152 centimeters (50 to 60 inches); black (5Y 2.5/2) very gravelly loam; massive; slightly sticky and slightly plastic; sulfurous odor; 40 percent basalt gravel; slightly acid (pH 6.5, 1:1 in water in place).

Range in characteristics

Soil moisture regime class: Aquic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months. The soils are flooded daily with ocean saltwater during periods of high tide.

Mean annual soil temperature: 28 degrees C (83 degrees F)

Linear extensibility: 1 to 3 percent; weighted average, 1.5 percent

Surface rock fragments: Mixed; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 5 percent cobbles

Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—0 to 20 centimeters (0 to 8 inches)

A horizon(s):

Hue—10YR

Value—2 moist
Chroma—1 moist
Texture—mucky silt loam
Size and content of rock fragments—mixed; 0 to 15 percent total rock fragments; 0 to 10 percent gravel; 0 to 5 percent cobbles.
Electrical conductivity—10 to 25 mmhos/cm
Sodium adsorption ratio—15 to 20
Reaction—pH of 4.5 to 5.0
Aluminum saturation—6 to 16 percent
Content of organic matter—15 to 25 percent

Cg horizon(s):
Hue—10YR
Value—2 or 3 moist
Chroma—1 moist
Texture—mucky silt loam
Size and content of rock fragments—mixed; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles.
Electrical conductivity—10 to 25 mmhos/cm
Sodium adsorption ratio—10 to 20
Aluminum saturation—17 to 24 percent
Reaction—pH of 3.1 to 4.4
Content of organic matter—5.0 to 10.0 percent

2Cg horizon(s):
Hue—5Y
Value—2.5 moist
Chroma—1 or 2 moist
Texture—mucky silt loam, loam, or silt loam
Size and content of rock fragments—mixed; 0 to 60 percent total rock fragments; 0 to 60 percent gravel; 0 to 25 percent cobbles.
Electrical conductivity—10 to 25 mmhos/cm
Sodium adsorption ratio—10 to 20
Reaction—pH of 3.1 to 4.4
Aluminum saturation—49 to 68 percent
Content of organic matter—5.0 to 10.0 percent

Nekken Series

Map units: 619, 632, 633, 659, 661
Depth class: Moderately deep
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Coastal benches and ridges on hills
Landscape: Volcanic islands
Hillslope position: Shoulders, backslopes
Geomorphic position: Crests, side slopes
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation
Elevation: 1 to 175 meters (3 to 574 feet)
Slope: 12 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Clayey-skeletal, mixed, active, isohyperthermic Typic Haplohumults

Typical pedon

Nekken very gravelly silt loam on a west-by-northwest-facing, convex slope of 27 percent, under an Ollei-Nekken-Rock Outcrop forest plant community, at an elevation of 15 meters (49 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on January 10, 1980, the soil was moist throughout. About 50 percent the surface is covered by channers consisting of flat, angular, indurated tuff. About 5 percent of the surface is bare ground.

Type location.—Ngatpang Municipality, Babeldaob Island, Palau; from the pier at Ngereklmadel village, travel by boat south-southeast 1.13 km (0.7 mile) to the channel through the mangroves; from land fall at the back of channel through the mangroves, head south upslope along a trail about 185 meters (607 feet) past a stand of betel nut trees; site is on a north-by-northwest aspect: 443,087 meters E., 826,521 meters N., UTM zone 53; latitude 7 degrees 28 minutes 37.41 seconds N. and longitude 134 degrees 29 minutes 3.08 seconds E.; WGS 84.

A—3 to 23 centimeters (1 to 9 inches); very dark brown (10YR 2/2) very gravelly silt loam; strong fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium and common coarse roots; many very fine interstitial pores; 50 percent channers (flat, angular, indurated tuff); slightly acid (pH 6.1, 1:1 in water); clear wavy boundary. (10 to 20 centimeters thick)

Bt—23 to 48 centimeters (9 to 19 inches); dark yellowish brown (10YR 4/4) very gravelly silty clay loam; moderate very fine and fine subangular blocky structure; firm, moderately sticky and moderately plastic; many very fine, fine, and medium and common coarse roots; many very fine interstitial pores; common thin, faint dark brown (10YR 3/3 moist) coatings on faces of peds and in pores; 45 percent channers (flat, angular, indurated tuff); moderately acid (pH 6.0, 1:1 in water); clear wavy boundary. (10 to 53 centimeters thick)

C—48 to 58 centimeters (19 to 23 inches); very dark brown (10YR 2/2) very gravelly silt loam; massive; firm, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine tubular and interstitial pores; 85 percent channers (flat, angular, indurated tuff); high excavation difficulty; strongly acid (pH 5.4, 1:1 in water); abrupt wavy boundary. (0 to 33 centimeters thick)

R—58 centimeters (23 inches); black (10YR 2/1) and olive (5Y 4/3), bedded tuff with very fine phenocrysts of hornblende; indurated; fractured at intervals of 10 centimeters (4 inches) or more; neutral (pH 6.7, 1:1 in water).

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 27 degrees C (81 degrees F)

Depth to lithic bedrock: 50 to 100 centimeters (20 to 39 inches)

Surface rock fragments: Indurated, subangular andesite and basaltic breccia and tuff; 35 to 50 percent total rock fragments; 35 to 50 percent gravel; 0 to 80 percent cobbles; 0 to 20 percent stones; 0 to 10 percent boulders; the average distance between the stones is about 5 meters (16 feet), and that between the boulders is about 15 meters (49 feet.)

Oi and Oe horizon(s):

Hue—7.5YR or 10YR
Value—2 or 3 moist
Chroma—1 or 2 moist

In-lieu texture—moderately decomposed plant material or slightly decomposed plant material that is gravelly or very gravelly in some pedons
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 0 to 40 percent total rock fragments; 5 to 40 percent gravel; 0 to 35 percent cobbles
Reaction—pH of 5.6 to 6.5
Content of organic matter—60 to 70 percent

A and AB horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3 moist
Chroma—2 or 3 moist
Texture—silt loam or silty clay loam that is cobbly or very cobbly in some pedons
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 0 to 50 percent total rock fragments; 5 to 50 percent gravel; 0 to 35 percent cobbles
Reaction—pH of 4.9 to 5.9
Aluminum saturation—0 to 10 percent
Content of organic matter—3.0 to 8.0 percent

Bt horizon(s):
Hue—10YR or 7.5YR
Value—3 or 4 moist
Chroma—4 to 6 moist
Texture—silt loam or clay loam that is very cobbly
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 10 to 30 percent total rock fragments; 5 to 25 percent gravel; 15 to 30 percent cobbles
Reaction—pH of 5.2 to 5.6
Aluminum saturation—40 to 60 percent
Content of organic matter—0.7 to 1.1 percent

C, BCt, CBt horizon(s):
Hue—7.5YR or 10YR
Value—2 to 4 moist
Chroma—2 to 6 moist
Texture—silt loam, silty clay loam and may be very flaggy, or extremely flaggy
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 35 to 60 percent total rock fragments; 40 to 60 percent gravel; 10 to 25 percent cobbles
Reaction—pH of 5.1 to 5.4
Aluminum saturation—56 to 80 percent
Content of organic matter—0.5 to 1.0 percent

Ngardmau Series

Map units: 612, 613, 614 (fig. 30), 620, 621
Depth class: Very deep
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Erosional crests and ridges on hills
Landscape: Volcanic islands
Hillslope position: Shoulders, summits, backslopes
Geomorphic position: Crests, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff

Figure 30.—The Ngardmau series is characterized by infertile topsoil over infertile subsoil. Below a depth of 50 centimeters, the subsoil retains some characteristics of the parent material, which gives the subsoil the variegated color pattern of red, yellow, and white. Ngardmau soils support mostly false staghorn ferns (*Gleichenia linearis* or *Dicranopteris linearis*). This profile is in map unit 614 (Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes), in Airai State, Babeldaob Island.

Elevation: 4 to 179 meters (13 to 587 feet)
Slope: 2 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, parasesquic, isohyperthermic Oxic Dystrudepts

Typical pedon

Ngardmau very gravelly silty clay loam on an east-facing, convex slope of 18 percent, under a fern-land plant community, at an elevation of 98 meters (322 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on October 5, 1979, the soil was moist throughout. About 80 percent of the surface is covered by gravel consisting of petroferric fragments, ironstone, and gibbsite concretions. About 20 percent of the surface is bare ground.

Type location.—Airai Municipality, Babeldaob Island, Republic of Palau; about 1,430 meters (4,690 feet) north and 975 meters (3,200 feet) east of the southeast corner of Ngerimel Reservoir dam; proceed north on the road to Nekken, approximately 2.1 kilometers (1.3 miles) north past the road to Ngerimel Reservoir, then 45 meters (145 feet) east of the road; 448,996 meters E., 816,502 meters N., UTM zone 53; latitude 7 degrees 23 minutes 11.28 seconds N. and longitude 134 degrees 30 minutes 45.59 seconds E.; WGS 84.

A—0 to 13 centimeters (0 to 5 inches); strong brown (7.5YR 4/6) very gravelly silty clay loam, brown (7.5YR 5/4) dry; moderate very fine and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine tubular pores; 50 percent gravel gibbsite pendants and ironstone concretions; extremely acid (pH 4.3, 1:1 in water); clear wavy boundary. (10 to 20 centimeters thick)

Bo—13 to 25 centimeters (5 to 10 inches); 60 percent yellowish red (5YR 4/6) and 40 percent red (2.5YR 4/6) silty clay; moderate medium subangular blocky structure parting to strong very fine and fine angular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots; common very fine and fine tubular and common medium tubular pores; continuous thin clay coatings on faces of peds and lining pores; 2 percent gravel (ironstone concretions); very strongly acid (pH 4.5, 1:1 in water); gradual wavy boundary. (10 to 25 centimeters thick)

BC—25 to 41 centimeters (10 to 16 inches); 40 percent red (2.5YR 4/6) and 30 percent yellowish red (5YR 4/6) silty clay with 30 percent variegated dark red (10R 3/6) and red (10R 4/8) saprolite that has common fine greenish gray (5GY 6/1) and light greenish gray (5GY 7/1) specks of feldspar; moderate medium and coarse subangular blocky structure parting to moderate very fine and fine angular blocky; rock structure in the saprolite; firm, moderately sticky and moderately plastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; many thin clay coatings on faces of peds and lining pores; 2 percent gravel (ironstone concretions); very strongly acid (pH 4.5, 1:1 in water); gradual irregular boundary. (0 to 20 centimeters thick)

CB—41 to 200 centimeters (16 to 80 inches); 50 percent weak red (10R 4/4) and 50 percent yellowish red (5YR 4/6) silty clay loam with many fine greenish gray (6/5GY, 6/5BG) specks of saprolitic feldspar; moderate medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots within interior of peds; common very fine tubular pores in interstices between peds; common thin clay coatings on faces of peds and lining pores; 4 percent gravel (ironstone and gibbsite concretions); very strongly acid (pH 4.5, 1:1 in water).

Range in characteristics

Soil moisture regime class: Perudic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.
Mean annual soil temperature: 28 degrees C (83 degrees F)
Thickness of the solum: 50 to 100 centimeters (20 to 39 inches)
Linear extensibility: 3 to 7 percent; weighted average, 4.8 percent
Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 20 to 95 percent total rock fragments; 20 to 80 percent gravel; 0 to 15 percent cobbles

A, AB, and BA horizon(s):
Hue—5YR, 7.5YR, or 10YR
Value—3 or 4 moist
Chroma—2 to 6 moist
Texture—loam or silty clay loam that is gravelly in some pedons
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 35 percent total rock fragments; 0 to 35 percent gravel; 0 to 10 percent cobbles
Reaction—pH of 4.9 to 5.5
New Zealand P retention—50 to 60 percent
Aluminum saturation—55 to 70 percent
Content of organic matter—1 to 4 percent

Bo or Bw horizon(s):
Hue—10R, 2.5YR, 5YR, or 7.5YR
Value—3 to 5 moist
Chroma—3 to 6 moist
Texture—silty clay or silty clay loam that is gravelly in some pedons
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 35 percent total rock fragments; 0 to 35 percent gravel; 0 to 10 percent cobbles
Reaction—pH of 4.9 to 5.1
New Zealand P retention—50 to 70 percent
Aluminum saturation—75 to 70 percent
Content of organic matter—0 to 0.7 percent

C, BC, CB, CBt, and BCt horizon(s):
Hue—10R, 2.5YR, 5YR, 7.5YR, or 10YR
Hue of clay coatings—7.5YR or 10YR
Hue of saprolite—2.5Y, 5GY, or 5Y
Value—3 to 5 moist
Chroma—3 to 8 moist
Value of saprolite—6 to 8 moist
Chroma of saprolite—1 to 3 moist
Texture—silty clay, clay, silty clay loam, or loam
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 5.1 to 5.5
New Zealand P retention—50 to 65 percent
Aluminum saturation—85 to 90 percent
Content of organic matter—0.5 to 0.6 percent

Ngatpang Series

Map units: 624 (fig. 31), 625, 626, 627
Depth class: Very deep
Drainage class: Moderately well drained or well drained
Most limiting permeability (Ksat): 0.0036-0.036 cm/hr (0.0015-0.014 in/hr); low
Landform: Dissected fluviomarine terraces on low hills
Landscape: Volcanic islands
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes
Geomorphic position: Risers, treads
Parent material: Interbedded, clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airai Clay Formation
Elevation: 1 to 113 meters (3 to 371 feet)
Slope: 2 to 50 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, halloysitic, isohyperthermic Typic Haploperox

Typical pedon

Ngatpang silty clay loam on a south-facing, linear slope of 3 percent, under anthropic savannah, at an elevation of 10 meters (33 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on October 2, 1979, the soil was moist throughout. About 10 percent of the surface is covered by gravel consisting of gibbsite concretions. About 5 percent of the surface is bare ground.

Type location.—Airai Municipality, Babeldaob Island, Republic of Palau; about 90 meters (295 feet) southwest of the prawn ponds in the eastern part of Airai Municipality; 453,773 meters E., 814,879 meters N., UTM zone 53; latitude 7 degrees 22 minutes 18.69 seconds N. and longitude 134 degrees 34 minutes 52.09 seconds E.; WGS 84.

A1—0 to 5 centimeters (0 to 2 inches); dark brown (10YR 3/3) silty clay loam; moderate fine granular structure; friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine and fine and few medium tubular pores; approximately 10 percent gravel (limonite and spherical solid gibbsite concretions); very strongly acid (pH 4.9, 1:1 in water); clear smooth boundary. (2 to 20 centimeters thick); lab sample number 80P00756

A2—5 to 15 centimeters (2 to 6 inches); 85 percent dark yellowish brown (10YR 4/4) silty clay loam and 15 percent fine blotches of dark brown (10YR 3/3) silty clay loam; moderate fine subangular blocky structure; firm, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine and few medium tubular pores; common fine specks of light yellowish brown (10YR 6/4) gibbsite; common thin and moderately thick dark brown (10YR 3/3) coatings in root and worm channels; approximately 10 percent gravel (gibbsite concretions); very strongly acid (pH 4.6, 1:1 in water); gradual smooth boundary. (5 to 15 centimeters thick); lab sample number 80P00757

Bo1—15 to 28 centimeters (6 to 11 inches); strong brown (7.5YR 4/6) gravelly silty clay; moderate fine subangular blocky structure; firm, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine and few medium tubular pores; common thin and moderately thick coatings on faces of peds and surfaces along pores; approximately 20 percent gravel (iron concretions); very strongly acid (pH 4.9, 1:1 in water); clear smooth boundary. (5 to 20 centimeters thick); lab sample number 80P00758

Figure 31.—Ngatpang soils formed in marine terrace sediments. They are slightly better drained than Tabecheding soils and therefore are redder. This profile shows a black lignite layer in Ngatpang silty clay loam, 2 to 6 percent slopes (map unit 624), in Aimeliik State, Babeldaob Island.

Bo2—28 to 48 centimeters (11 to 19 inches); 70 percent strong brown (7.5YR 4/6) clay and 30 percent yellowish red (5YR 5/8) clay; weak medium prismatic structure parting to strong very fine and fine angular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots along vertical faces of peds; common very fine and fine tubular pores; continuous thin coatings on faces of peds and surfaces along pores; approximately 2 percent gravel (iron concretions); very strongly acid (pH 4.6, 1:1 in water); gradual wavy boundary. (20 to 50 centimeters thick); lab sample number 80P00759

Bo3—48 to 94 centimeters (19 to 37 inches); strong brown (7.5YR 5/8) clay; weak medium prismatic structure parting to strong very fine and fine angular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots along vertical faces of peds; common very fine, fine, and medium tubular pores and few fine vesicular pores; continuous thin coatings on faces of peds and surfaces along pores; approximately 2 percent gravel (ironstone concretions); common medium distinct yellowish red (5YR 5/8) masses of iron in the matrix; very strongly acid (pH 4.7, 1:1 in water); clear wavy boundary. (20 to 50 centimeters thick); lab sample number 80P00760

Bo4—94 to 114 centimeters (37 to 45 inches); yellowish brown (10YR 5/6) clay; moderately medium and coarse subangular blocky structure parting to strong very fine and fine angular blocky; firm, moderately sticky and moderately plastic; few fine roots; common very fine and fine tubular pores; continuous pressure faces; few thin black (7.5YR 2.5/1) manganese coatings on faces of peds; common medium distinct yellowish red (5YR 4/6); strong brown (7.5YR 5/8) masses of iron and light yellowish brown (10YR 6/4) iron depletions in the matrix; very strongly

acid (pH 4.9, 1:1 in water); gradual wavy boundary. (20 to 50 centimeters thick); lab sample number 80P00761

C—114 to 152 centimeters (45 to 60 inches); variegated 50 percent light gray (10YR 7/2) and 50 percent yellowish brown (10YR 5/6) clay; common fine distinct yellowish red (5YR 4/6), strong brown (7.5YR 5/8), and light yellowish brown (10YR 6/4) mottles; moderate medium and coarse subangular blocky structure parting to strong fine angular blocky; firm, moderately sticky and moderately plastic; common very fine and fine tubular pores; continuous pressure faces; few thin black (7.5YR 2.5/1) manganese coatings on faces of peds; few fine and medium black (7.5YR 2.5/1) manganese concretions; common fine distinct yellowish red (5YR 4/6) and strong brown (7.5YR 5/8) masses of iron and light yellowish brown (10YR 6/4) iron depletions in the matrix; very strongly acid (pH 4.9, 1:1 in water). (0 to 50 centimeters thick)); lab sample number 80P00762

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 28 degrees C (83 degrees F)

Control section: 25 to 100 centimeters (10 to 39 inches)

Thickness of the solum: 100 to 150 centimeters (39 to 150 inches).

Linear extensibility: 12 to 15; weighted average, 13.2 percent

Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles;

Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—40 to 50 centimeters (16 to 20 inches)

A horizon(s):

Hue—7.5YR or 10YR

Value—3 or 4 moist

Chroma—3 or 4 moist

Texture—silty clay loam or silt loam that is gravelly in some pedons

Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 35 percent total rock fragments; 0 to 35 percent gravel; 0 to 15 percent cobbles

Reaction—pH of 4.5 to 5.5

New Zealand P retention—30 to 60 percent

Aluminum saturation—30 to 45 percent

Content of organic matter—2 to 4 percent

Bo horizon(s):

Hue—2.5YR, 5YR, or 7.5YR

Value—4 or 5 moist

Chroma—6 or 8 moist

Texture—silty clay or clay

Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 5 percent total rock fragments; 0 to 5 percent gravel; 0 to 5 percent cobbles

Reaction—pH of 3.6 to 5.0

New Zealand P retention—70 to 80 percent

Aluminum saturation—37 to 94 percent

Redoximorphic features—few or common; fine or medium; hue of 5YR, 7.5YR, or 10YR; value of 4 to 6 moist; and chroma of 4 to 8 moist

BC, C, and CB horizon(s):
Hue—10YR or 2.5Y
Value—5 to 8 moist
Chroma—2 to 6 moist
Texture—silty clay or clay
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions, and lignite; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.5 to 5.5
New Zealand P retention—75 to 90 percent
Aluminum saturation—1 to 4 percent
Redoximorphic features—few or common fine or medium iron depletions or iron masses with hue of 5YR, 7.5YR, or 10YR; value of 4 to 6 moist; and chroma of 4 to 8 moist

Ngedebus Series

Map unit: 628 (fig. 32)
Depth class: Very deep
Drainage class: Somewhat excessively drained
Most limiting permeability (Ksat): More than 36 cm/hr (more than 14.17 in/hr); very high
Landform: Back-barrier beaches, beach terraces, beach ridges, beaches, generally on the lagoon side of atolls
Landscape: Limestone islands, barrier islands, atolls, areas of karst
Hillslope position: Toeslopes
Geomorphic position: Treads, risers
Parent material: Water and wind-deposited coralline sandy material
Elevation: -1 to 6 meters (-3 to 20 feet)
Slope: 0 to 3 percent

Climatic data
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Sandy, carbonatic, isohyperthermic Typic Haprendolls

Typical pedon

Ngedebus highly organic loamy fine on an east-by-southeast-facing, linear slope of 3 percent, in a *Casuarina* and atoll forest plant community, at an elevation of 1 meter (3.3 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on September 12, 2006, the soil was moist throughout. About 3 percent of the surface is covered by gravel and 1 percent by cobbles. The fragments are coralline limestone. About 5 percent of the surface is bare ground.

Type location.—Koror Municipality, Ulong Island, Republic of Palau; about 242 meters (95 feet) from the northern edge of the beach heading southeast, head east 38 meters (125 feet) into a forest; 420,791 meters E., 805,316 meters N., UTM zone 53; latitude 7 degrees 17 minutes 5.91 seconds N. and longitude 134 degrees 16 minutes 56.73 seconds E.; WGS 84.

Oi—0 to 1 centimeters (0 to 0.4 inch); reddish black (10R 2/1) highly decomposed plant material; about 15 percent fiber rubbed; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many very fine and fine dendritic tubular pores; neutral (pH 7.1, 1:1 in water); abrupt smooth boundary. (0 to 5 centimeters thick)

Figure 32.—Ngedebus soils formed under vegetation in coral sandy sediments. The sandy area in the foreground is Ngedebus parent material exposed at low tide. These soils have less than 35 percent gravel and cobbles. This area is mapped as Ngedebus highly organic fine sandy loam, 0 to 3 percent slopes (map unit 628), in Koror State, Ulong Island.

A1—1 to 5 centimeters (0.4 inch to 2 inches); dark grayish brown (10YR 4/2) (broken face) highly organic loamy fine sand, very dark brown (10YR 2/2) broken face, moist; 3 percent clay; weak fine subangular blocky and moderate medium granular structure; loose when dry and moist, nonsticky and nonplastic when wet; many very fine, many fine, common medium, common coarse, and common very coarse roots throughout; many fine interstitial, common fine tubular, many very fine interstitial, and common very fine tubular pores; slightly alkaline (pH 7.4); clear smooth boundary. (0 to 10 centimeters thick); lab sample number 07N00522

A2—5 to 15 centimeters (2 to 6 inches); dark grayish brown (2.5Y 4/2) (broken face) loamy sand, very dark grayish brown (10YR 3/2) broken face, moist; 3 percent clay; weak very fine and fine subangular blocky structure; loose when dry and moist, nonsticky and nonplastic when wet; many very fine, common fine, common medium, and common coarse roots throughout; many fine interstitial, common fine tubular, many very fine interstitial, and common very fine tubular pores; slightly alkaline (pH 7.4); clear wavy boundary. (5 to 20 centimeters thick); lab sample number 07N00523

AC—15 to 28 centimeters (6 to 11 inches); pale brown (10YR 6/3) (broken face) sand, light brownish gray (10YR 6/2) broken face, moist; 1 percent clay; weak fine and medium subangular blocky structure; loose when dry and moist, nonsticky and nonplastic when wet; common very fine, common fine, common medium, common coarse, and common very coarse roots throughout; many fine interstitial, common fine tubular, and many very fine interstitial pores; slightly alkaline (pH 7.7); clear wavy boundary. (10 to 30 centimeters thick); lab sample number 07N00524

C1—28 to 51 centimeters (11 to 20 inches); very pale brown (10YR 8/2) (broken face) sand, light gray (10YR 7/2) broken face, moist; 1 percent clay; single grain; loose when dry and moist, nonsticky and nonplastic when wet; common very fine, common fine, common medium, and common coarse roots throughout; many fine interstitial, common medium tubular, and many very fine interstitial pores; rock fragments occurring as coralline limestone; 1 percent gravel and 1 percent cobbles; slightly alkaline (pH 7.7); clear smooth boundary. (15 to 30 centimeters thick); lab sample number 07N00525

C2—51 to 79 centimeters (20 to 31 inches); very pale brown (10YR 8/2) (broken face) sand, very pale brown (10YR 8/2) broken face, moist; 1 percent clay; single grain; loose when dry and moist, nonsticky and nonplastic when wet; common very fine, common fine, common coarse, and common very coarse roots throughout; many fine interstitial, common medium tubular, and many very fine interstitial pores; rock fragments occurring as coralline limestone; 1 percent gravel and 1 percent cobbles; moderately alkaline (pH 7.9); clear smooth boundary. (15 to 30 centimeters thick); lab sample number 07N00526

C3—79 to 107 centimeters (31 to 42 inches); very pale brown (10YR 8/3) (broken face) sand, very pale brown (10YR 8/3) broken face, moist; 1 percent clay; single grain; loose when dry and moist, nonsticky and nonplastic when wet; common very fine, common fine, common medium, and common coarse roots throughout; many fine interstitial, common medium tubular, and many very fine interstitial pores; rock fragments occurring as coralline limestone; 1 percent gravel and 1 percent cobbles; moderately alkaline (pH 7.9); clear smooth boundary. (25 to 40 centimeters thick); lab sample number 07N00527

C4—107 to 201centimeters (42 to 79 inches); very pale brown (10YR 8/3) (broken face) sand, very pale brown (10YR 8/3) broken face, moist; 1 percent clay; massive; loose when dry and moist, nonsticky and nonplastic when wet; common fine, common medium, common coarse, and common very coarse roots throughout; common medium interstitial and many very fine interstitial pores; rock fragments occurring as coralline limestone; 1 percent gravel and 1 percent cobbles; moderately alkaline (pH 7.9). (70 to 130 centimeters thick); lab sample number 07N00528

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 27 degrees C (81 degrees F)

Control section: 25 to 100 centimeters (10 to 39 inches)

Thickness of the solum: 50 to 100 centimeters (20 to 39 inches)

Surface rock fragments: Hard, subrounded coralline limestone; 0 to 15 percent total rock fragments; 0 to 5 percent fine gravel; 0 to 5 coarse gravel; 0 to 5 percent cobbles

Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—100 to 150 centimeters (39 to 59 inches)

Oi horizon(s):

Hue—7.5YR or 10YR

Value—2 or 3

Chroma—1 or 2

In lieu texture—slightly decomposed plant material

Size and content of rock fragments—hard, subrounded coralline limestone; 0 to 15 percent total rock fragments; 0 to 5 percent fine gravel; 0 to 5 coarse gravel; 0 to 5 percent cobbles

Calcium carbonate equivalent—0 to 5 percent

Electrical conductivity—0 to 5 mmhos/cm
Reaction—neutral to slightly alkaline
Content of organic matter—60.0 to 100.0 percent

A horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 to 3
Texture—sand or loamy sand that is highly organic
Size and content of rock fragments—hard, subrounded coralline limestone; 0 to 15 percent total rock fragments; 0 to 5 percent fine gravel; 0 to 5 coarse gravel; 0 to 5 percent cobbles
Calcium carbonate equivalent—70 to 95 percent
Electrical conductivity—0 to 2 mmhos/cm
Reaction—pH of 7.0 to 7.8
Content of organic matter—4 to 13 percent

AC horizon(s):
Hue—7.5YR or 10YR
Value—4 to 8
Chroma—2 to 5
Texture—sand or loamy sand
Size and content of rock fragments—hard, subrounded coralline limestone; 0 to 15 percent total rock fragments; 0 to 5 percent fine gravel; 0 to 5 coarse gravel; 0 to 5 percent cobbles
Calcium carbonate equivalent—90 to 98 percent
Electrical conductivity—0 to 2 mmhos/cm
Reaction—pH of 7.8 to 8.3
Content of organic matter—2.5 to 5 percent

C horizon(s):
Hue—7.5YR or 10YR
Value—4 to 8 moist
Chroma—2 to 4 moist
Texture—loamy sand or sand that is gravelly in some pedons
Size and content of rock fragments—hard, subrounded coralline limestone; 0 to 15 percent total rock fragments; 0 to 5 percent fine gravel; 0 to 5 coarse gravel; 0 to 5 percent cobbles
Reaction—slightly alkaline or moderately alkaline
Content of organic matter—0.0 to 0.5 percent

Ngersuul Series

Map unit: 630
Depth class: Very deep
Drainage class: Somewhat poorly drained
Most limiting permeabilty (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Backswamps, flood plains, valley floors
Landscape: Volcanic islands
Hillslope position: Talf, rises
Geomorphic position: Risers, treads
Parent material: Alluvium derived from basalt, andesite, dacite, marine deposits, volcanic breccias, bedded tuff, or other tuff
Elevation: 0 to 80 meters (2 to 262 feet)
Slope: 0 to 4 percent

Climatic data

Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, mixed, active, isohyperthermic Fluvaquentic Dystrudepts

Typical pedon

Ngersuul silt loam on a south-facing, linear slope of 1 percent, under a riparian-forest plant community with scattered betel nut, at an elevation of 12 meters (39 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on March 10, 1980, the soil was moist throughout and had a water table at a depth of 66 centimeters (26 inches).

Type location.—Ngaremlengui Municipality, Babeldaob Island, Republic of Palau; about 7.5 kilometers (4.66 miles) up the Ngatpang River from the bay, about 10 meters (33 feet) downstream from remnant of a stone wall in the riverbank, and then 18 meters (59 feet) south of the river; 448,613 meters E., 824,745 meters N., UTM zone 53; latitude 7 degrees 27 minutes 39.78 seconds N. and longitude 134 degrees 32 minutes 3.44 seconds E.; WGS 84.

A—0 to 15 centimeters (0 to 6 inches); reddish brown (5YR 4/3) silt loam that grades to strong brown (7.5YR 4/6) in the lower 5 centimeters (2 inches) of the horizon; weak and moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine, medium, and coarse roots; common very fine and fine tubular pores; very strongly acid (pH 5.0, in 1:1 in water); clear wavy boundary. (10 to 30 centimeters thick); lab sample number 80P01025

Bw1—15 to 23 centimeters (6 to 9 inches); yellowish brown (10YR 5/8) silty clay loam; weak medium subangular blocky structure; firm, moderately sticky and slightly plastic; few very fine, fine, and medium roots; common very fine and few fine tubular pores; strongly acid (pH 5.2, in 1:1 in water); gradual wavy boundary. (6 to 30 centimeters thick); lab sample number 80P01026

Bw2—23 to 76 centimeters 9 to 30 inches); brownish yellow (10YR 6/8) silty clay loam; comm. on medium distinct red (2.5YR 5/8) and few fine distinct pinkish gray (5YR 6/2) mottles; moderate medium subangular blocky structure; firm, moderately sticky and slightly plastic; few very fine and fine roots; few very fine and fine tubular pores; reducing regime indicated by permanganate test; standing water at a depth of 66 centimeters (26 inches); strongly acid (pH 5.2, in 1:1 in water); abrupt smooth boundary. (25 to 70 centimeters thick)

2Cg—76 to 99 centimeters (30 to 39 inches); very dark gray (5Y 3/1) silty clay loam; weak medium subangular blocky structure; firm, moderately sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; reducing regime indicated by permanganate test; strongly acid (pH 5.5, in 1:1 in water); abrupt wavy boundary. (50 to 100 centimeters thick)

3Oe—99 to 200 centimeters (39 to 79 inches); very dark gray (2.5Y 3/1) mucky peat; massive; friable, nonsticky and slightly plastic; many very fine and fine tubular pores; moderately acid (pH 5.6, in 1:1 calcium chloride).

Range in characteristics

Soil moisture regime class: Aquic

Seasonal precipitation pattern: The soil moisture control section is not dry in any part for as long as 90 cumulative days, and precipitation exceeds evapotranspiration. The moisture tension rarely reaches 100kPa, and water moves through the soil in all months of the year. The driest months are February, March, and April.

Mean annual soil temperature: 28 degrees C (83 degrees F)

Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—24 to 36 inches (61 to 91 centimeters)

Oi horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3 moist
Chroma—1 or 2 moist
In lieu texture—slightly decomposed plant material or moderately decomposed plant material
Reaction—pH of 5.6 to 6.0
Content of organic matter—60 to 70 percent

A horizon(s):
Hue—5YR, 7.5YR, or 10YR
Value—2 or 4 moist
Chroma—2 to 4 moist
Texture—silt loam or silty clay loam
Size and content of rock fragments: Petroferric fragments and gibbsitic concretions; 0 to 5 percent total rock fragments; 0 to 5 percent gravel; 0 to 5 percent cobbles
Reaction—pH of 4.5 to 5.5
Aluminum saturation—13 to 15 percent
New Zealand P retention—60 to 80 percent
Content of organic matter—5 to 8 percent

Bw horizon(s):
Hue—10R, 2.5YR, 2.5Y, 10YR, or 5Y
Value—3 to 5 moist
Chroma—2 to 8 moist
Texture—silty clay loam or silty clay
Size and content of rock fragments: Petroferric fragments and gibbsitic concretions; 0 to 5 percent total rock fragments; 0 to 5 percent gravel; 0 to 5 percent cobbles
Reaction—pH of 4.5 to 6.0
Aluminum saturation—10 to 15 percent
New Zealand P retention—60 to 80 percent
Content of organic matter—1 to 3 percent

2Cg horizon(s):
Hue—10YR, 5BG, 5GY, 2.5Y, or 5Y
Value—2.5 to 5
Chroma—1 to 3
Texture—silty clay loam or silt loam
Size and content of rock fragments: Petroferric fragments and gibbsitic concretions; 0 to 5 percent total rock fragments; 0 to 5 percent gravel; 0 to 5 percent cobbles
Reaction—pH of 4.5 to 6.0
Aluminum saturation—18 to 28 percent
New Zealand P retention—60 to 80 percent
Content of organic matter—1 to 3 percent

Odesangel Series

Map unit: 631
Depth class: Very deep
Drainage class: Very poorly drained
Most limiting permeability (Ksat): 3.6-36 cm/hr (1.42-14.17 in/hr); high
Landform: Solution sinkholes, artificial fens, scalped areas, depressions, atolls
Landscape: Islands, atolls, limestone islands, areas of karst

Hillslope position: Footslopes
Geomorphic position: Dips
Parent material: Organic material derived dominantly from freshwater marsh vegetation overlying coralline sandy material and/or limestone
Elevation: 0 to 25 meters (0 to 82 feet)
Slope: 0 to 1 percent

Climatic data
Mean annual precipitation: 3,000 to 4,650 millimeters (118 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Sandy or sandy-skeletal, carbonatic, euic, isohyperthermic Terric Haplohemists

Typical pedon

Odesangel mucky peat in a level area supporting wetland taro and limestone-swamp forest plant communities. Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on February 6, 1980, the soil was saturated throughout and had a water table at a depth of 20 centimeters (8 inches).

Type location.—Peleliu Municipality and Island, Republic of Palau; about 1.9 kilometers (0.99 mile) south-southwest of the school yard at Peleliu Village on the main road and then about 94 meters (308 feet) northwest of the roadway at the edge of a taro patch; 417,284 meters E., 777,060 meters N., UTM zone 53; latitude 7 degrees 1 minutes 45.64.08 seconds N. and longitude 134 degrees 15 minutes 3.91 seconds E.; WGS 84.

Oe1—0 to 8 centimeters (0 to 3 inches); dark brown (7.5YR 3/2) mucky peat; 80 percent fiber, 20 percent rubbed; massive; nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; color is 7.5YR 7/4 in pyrophosphate solution; neutral (pH 6.8, 1:1 in water); clear wavy boundary. Lab sample number 80P01023

Oe2—8 to 53 centimeters (3 to 21 inches); dark brown (7.5YR 3/2) mucky peat; about 70 percent fiber, 22 percent rubbed; massive; nonsticky and nonplastic; common very fine, fine, and medium roots; color is 7.5YR 7/4 in pyrophosphate solution; neutral (pH 6.8, 1:1 in water); clear smooth boundary. (Combined thickness of the Oe horizons is 45 to 75 centimeters.); lab sample number 80P01024

2C—53 to 150 centimeters (21 to 59 inches); pale brown (10YR 6/3) coarse sand; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; moderately alkaline (pH 8.0, 1:1 in water). (75 to 105 centimeters thick)

Range in characteristics

Soil moisture regime class: Aquic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months. The soils are flooded daily with ocean saltwater during periods of high tide.
Linear extensibility: 0 to 1 percent; weighted average, 0.5 percent
Seasonal high water table: Occurring in all months of the year;
depth to the top of the water table—0 to 25 centimeters (0 to 10 inches)

Oa, Oe, and Oi horizon(s):
Hue—7.5YR or 10YR
Value—2 to 4 moist
Chroma—1 to 3 moist
Texture—muck, mucky peat, or peat
Total content of rock fragments—0 percent

Calcium carbonate equivalent—0 to 5 percent
Electrical conductivity—0 to 3 mmhos/cm
Sodium adsorption ratio—0 to 0
Reaction—pH of 3.0 to 7.3
Content of organic matter—60 to 95 percent

2C horizon(s):
Hue—10YR or 2.5Y
Value—6 to 8 moist
Chroma—1 to 4 moist
Texture—sand, coarse sand, sand, or mucky sand that is gravelly or very gravelly in some pedons
Size and content of rock fragments—coralline limestone; 0 to 50 percent total rock fragments; 0 to 50 percent gravel.
Calcium carbonate equivalent—85 to 95 percent
Electrical conductivity—0 to 2 mmhos/cm
Reaction—pH of 6.6 to 8.4
Content of organic matter—0.5 to 1.5 percent

Ollei Series

Map units: 619, 610, 611, 634, 632 (fig. 33), 633, 659, 660, 661
Depth class: Very shallow or shallow
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Coastal benches and ridges on hills
Landscape: Volcanic islands
Hillslope position: Shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Residuum derived from andesite, dacite, basaltic breccia, and tuff; the bedrock is commonly part of the Ngeremlengui Formation and to a lesser extent is the Ngardok Member of the Aimeliik Formation
Elevation: 1 to 175 meters (3 to 574 feet)
Slope: 12 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Clayey-skeletal, parasesquic, isohyperthermic Humic Lithic Dystrudepts

Typical pedon

Ollei highly organic silt loam on a southwest-facing, convex/linear slope of 14 percent, under savannah, at an elevation of 1 meter (3.3 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on January 1, 1980, the soil was moist throughout. About 5 percent of the surface is covered by gravel consisting of angular, indurated tuff. About 5 percent of the surface is bare ground.

Type location.—Aimeliik Municipality, Babelthuap Island, Republic of Palau; about 5 meters (16 feet) inland from the midway point of the southwest shore of Bkurengel or about 53 meters (174 feet) east and 38 meters (125 feet) south of the westernmost tip of Bkurengel; 440,725 meters E., 823,221 meters N., UTM zone 53; latitude 7 degrees 26 minutes 49.88 seconds N. and longitude 134 degrees 27 minutes 46.17 seconds E.; WGS 84.

Figure 33.—Volcanic bedrock underlying the Ollei soil in the Ollei-Nekken complex, 30 to 50 percent slopes (map unit 632). This site is in Aimeliik State, Babeldaob Island.

Oi—0 to 4 centimeters (0 to 1 inch); very dark gray (7.5YR 3/1) slightly decomposed plant material of leaves and roots intermixed in a mat of live roots; 80 percent fiber, 50 percent rubbed; massive; nonsticky and nonplastic; many very fine, fine, and medium and few coarse and very coarse roots; many very fine, fine, and medium tubular and interstitial pores; 5 percent gravel (angular, indurated tuff); very strongly acid (pH 5.3, 1:1 in water); abrupt smooth boundary. (0 to 15 centimeters thick)

A—4 to 18 centimeters (1 to 7 inches); very dark brown (10YR 2/2) highly organic silt loam; moderate fine granular structure; friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; common very fine and fine tubular and interstitial pores; common fine and medium very dark brown (10YR 2/2) and black (10YR 2/1) wormcasts; 5 percent gravel (angular, indurated tuff); strongly acid (pH 5.4, 1:1 in water); clear wavy boundary. (10 to 20 centimeters thick)

Bw—18 to 28 centimeters (7 to 11 inches); brown (10YR 4/3) very gravelly loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and few fine and medium tubular and interstitial pores; 40 percent gravel; strongly acid (pH 5.1, 1:1 in water); clear wavy boundary. (10 to 36 centimeters thick)

CB—28 to 43 centimeters (11 to 17 inches); dark yellowish brown (10YR 4/4) flagstones; massive; friable, slightly sticky and slightly plastic; few fine and medium roots within the soil material and following fracture faces; 90 percent thick platy flagstones with soil material in horizontal beds between the rocks; strongly acid (pH 5.1, 1:1 in water); clear wavy boundary. (0 to 15 centimeters thick)

R—43 centimeters (17 inches); black (10YR 2/1) and olive (5Y 4/3), bedded tuff with fractures primarily in the horizontal plane; fractured at intervals of 10 centimeters (4 inches) or more; indurated; neutral (pH 6.7, 1:1 in water).

Range in characteristics

Soil moisture regime class: Perudic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.
Mean annual soil temperature: 27 degrees C (81 degrees F)
Depth to lithic bedrock: 4 to 20 inches (10 to 50 centimeters)
Surface rock fragments: Indurated, subangular andesite and basaltic breccia and tuff; 35 to 50 percent total rock fragments; 35 to 50 percent gravel; 0 to 10 percent cobbles; 0 to 20 percent stones; 0 to 10 percent boulders. The average distance between the stones is about 5 meters (16 feet), and that between the boulders is about 15 meters (49 feet.)

Oi and Oe horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3 moist
Chroma—1 or 2 moist
In lieu texture—moderately decomposed plant material or slightly decomposed plant material that is cobbly or very cobbly in some pedons
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 0 to 50 percent total rock fragments; 5 to 50 percent gravel; 0 to 35 percent cobbles
Reaction—pH of 5.6 to 6.5
Content of organic matter—60 to 70 percent

A and AB horizon(s):
Hue—7.5YR or 10YR
Value—2 or 3 moist
Chroma—2 or 3 moist
Texture—gravelly silt loam, very gravelly silt loam, or silt loam; highly organic in some pedons
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 0 to 60 percent total rock fragments; 0 to 45 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.9 to 5.6
New Zealand P retention—80 to 90 percent
Aluminum saturation—3 to 27 percent
Content of organic matter—8.0 to 20.0 percent

Bw horizon(s):
Hue—10YR or 7.5YR
Value—3 or 4 moist
Chroma—4 to 6 moist
Texture—silt loam or silty clay loam that is gravelly, very gravelly, or very flaggy in some pedons
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 35 to 60 percent total rock fragments; 0 to 45 percent gravel; 0 to 15 percent cobbles; 0 to 45 percent flagstones
Reaction—pH of 4.9 to 5.6
New Zealand P retention—80 to 90 percent
Aluminum saturation—22 to 27 percent
Content of organic matter—5 to 15 percent

C, BC, and CB horizon(s):
Hue—5Y or 10YR
Value—3 to 5 moist
Chroma—1 to 4 moist
Texture—extremely flaggy silty clay loam
Size and content of rock fragments—andesite, dacite, basaltic breccia, and tuff; 75 to 90 percent total rock fragments; 60 to 90 percent flagstones; 0 to 15 percent cobbles
Reaction—pH of 4.9 to 5.6
New Zealand P retention—80 to 90 percent
Aluminum saturation—22 to 27 percent
Content of organic matter—1 to 5 percent

Oxic Dystrudepts

Map units: 622, 623
Depth class: Very deep
Drainage class: Moderately well drained
Most limiting permeability (Ksat): Less than 0.0036 cm/hr (less than 0.0014 in/hr); very low
Landform: Dissected fluviomarine terraces on low hills
Landscape: Volcanic islands
Hillslope position: Toeslopes, summits, shoulders, backslopes, footslopes

Parent material: Interbedded, clays, silty clays, and lignite from marine deposits derived from volcanic rock; includes the Airai Clay Formation
Elevation: 1 to 101 meters (3 to 331 feet)
Slope: 2 to 50 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, halloysitic, isohyperthermic Oxic Dystrudepts

Typical pedon

Oxic Dystrudepts silty clay loam on a south-facing, linear slope of 3 percent, under anthropic savannah, at an elevation of 38 meters (125 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on July 7, 2006, the soil was moist throughout. About 10 percent of the surface is covered by gravel consisting of gibbsite concretions. About 45 percent of the surface is bare ground.

Type location.—Airai Municipality, Babeldaob Island, Republic of Palau; about 645 meters (2,120 feet) north of Ngatpang Falls in Ngatpang State; 447,943 meters E., 824,476 meters N., UTM zone 53; latitude 7 degrees 27 minutes 31 seconds N. and longitude 134 degrees 31 minutes 41.60 seconds E.; WGS 84.

A—0 to 2 centimeters (0 to 1 inch); dark brown (10YR 3/3) silty clay loam; moderate fine granular structure; friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine and fine and few medium tubular pores within interstices; 10 percent gravel (limonite and spherical solid gibbsite concretions); very strongly acid (pH 4.9, 1:1 in water); clear smooth boundary. (0 to 6 centimeters thick)

Bo—2 to 13 centimeters (1 to 5 inches); 70 percent strong brown (7.5YR 4/6) clay and 30 percent yellowish red (5YR 5/8) silty clay; weak medium prismatic structure parting to strong very fine and fine angular blocky; firm, moderately

sticky and moderately plastic; few very fine and fine roots along vertical faces of peds; common very fine and fine tubular pores within interstices; continuous thin coatings on faces of peds and surfaces along pores; 2 percent gravel (iron concretions); very strongly acid (pH 4.6, 1:1 in water); gradual wavy boundary. (10 to 15 centimeters thick)

C1—13 to 43 centimeters (5 to 17 inches); yellowish brown (10YR 5/6) clay; moderate medium and coarse subangular blocky structure parting to strong very fine and fine angular blocky; firm, moderately sticky and moderately plastic; few fine roots; common very fine and fine tubular pores; common continuous pressure faces; few thin black (7.5YR 2.5/1) manganese coatings on faces of peds; common medium distinct yellowish red (5YR 4/6) and strong brown (7.5YR 5/8) masses of iron and light yellowish brown (10YR 6/4) iron depletions in the matrix; very strongly acid (pH 4.9, 1:1 in water); gradual wavy boundary. (20 to 50 centimeters thick)

C2—43 to 200 centimeters (17 to 79 inches); variegated 50 percent light gray (10YR 7/2) and 50 percent yellowish brown (10YR 5/6) clay; common fine distinct yellowish red (5YR 4/6), strong brown (7.5YR 5/8), and light yellowish brown (10YR 6/4) mottles; moderate medium and coarse subangular blocky structure parting to strong fine angular blocky; firm, moderately sticky and moderately plastic; common very fine and fine tubular pores; continuous pressure faces; few thin black (7.5YR 2.5/1) manganese coatings on faces of peds; few fine and medium black (7.5YR 2.5/1) manganese concretions; common fine distinct yellowish red (5YR 4/6) and strong brown (7.5YR 5/8) masses of iron and light yellowish brown (10YR 6/4) iron depletions in the matrix; very strongly acid (pH 4.9, 1:1 in water). (50 to 150 centimeters thick))

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 28 degrees C (83 degrees F)

Control section: 25 to 100 centimeters (10 to 39 inches)

Linear extensibility: 12 to 15 percent; weighted average, 13.2 percent

Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles;

Seasonal high water table: Occurring in all months of the year; depth to top of the water table—14 to 18 inches (35 to 45 centimeters)

A horizon(s):

Hue—7.5YR or 10YR
Value—3 or 4 moist
Chroma—3 or 4 moist
Texture—silty clay loam, silt loam, or gravelly silty clay loam
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 35 percent total rock fragments; 0 to 35 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.5 to 5.5
New Zealand P retention—30 to 60 percent
Aluminum saturation—30 to 45 percent
Content of organic matter—2 to 4 percent

Bo horizon(s):

Hue—2.5YR, 5YR, or 7.5YR
Value—4 or 5 moist
Chroma—6 or 8 moist

Texture—silty clay or clay
Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 5 percent total rock fragments; 0 to 5 percent gravel; 0 to 5 percent cobbles
Reaction—pH of 3.6 to 5.0
New Zealand P retention—70 to 80 percent
Aluminum saturation—37 to 94 percent
Content of organic matter—0.5 to 1.5 percent
Redoximorphic features—few or common; fine or medium; hue of 5YR, 7.5YR, or 10YR; value of 4 to 6 moist; and chroma of 4 to 8 moist

BC, C, and CB horizon(s):
Hue—10YR or 2.5Y
Value—5 to 8 moist
Chroma—2 to 6 moist
Texture—silty clay or clay
Size and content of rock fragments—petroferric fragments, ironstone and gibbsite concretions, and lignite; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.5 to 5.5
New Zealand P retention—75 to 90 percent
Aluminum saturation—1 to 4 percent
Content of organic matter—0.0 to 0.5 percent
Redoximorphic features—few or common fine or medium iron depletions and iron masses with hue of 5YR, 7.5YR, or 10YR; value of 4 to 6 moist; and chroma of 4 to 8 moist

Palau Series

Map units: 635, 636 (fig. 34), 637, 638, 639, 640, 641, 642, 643, 644
Depth class: Very deep
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Hillslopes, anthropogenic terraces
Landscape: Volcanic islands
Hillslope position: Toeslopes, footslopes, shoulders, summits, backslopes
Geomorphic position: Head slopes, nose slopes, base slopes, side slopes
Parent material: Saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Elevation: 1 to 148 meters (3 to 486 feet)
Slope: 2 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, halloysitic, isohyperthermic Typic Haploperox

Typical pedon

Palau silty clay loam, on a south-by-southwest-facing, convex/linear slope of 15 percent, under a grassland-pandanus forest plant community, at an elevation of 31 meters (102 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on October 3, 1979, the soil was moist throughout. About 3 percent of the surface is covered by gravel consisting of petroferric fragments, ironstone, and gibbsite concretions. About 10 percent of the surface is bare ground.

Figure 34.—An area of Palau silty clay loam, 6 to 12 percent slopes (map unit 636). Palau soils occur under grass on volcanic uplands. They are similar to the forested Aimeliik soils, but they are less fertile. Many areas of Palau soils are on ancient manmade terraces. This area is in Airai State, Babeldaob Island.

Type location.—Airai Municipality, Babelthuap Island, Republic of Palau; about 0.5 kilometer (1,640 feet) north from the T intersection of the main road to the airport and the road to Nekken; stop at water tank, then head 143 meters (469 feet) east and 920 meters (3,020 feet) south; 448,565 meters E., 813,535 meters N., UTM zone 53; latitude 7 degrees 22 minutes 17.88 seconds N. and longitude 134 degrees 32 minutes 2.26 seconds E.; WGS 84.

A—0 to 10 centimeters (0 to 4 inches); dark brown (10YR 3/3) silty clay loam; moderate fine and medium subangular blocky structure parting to moderate very fine and fine granular; friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular and interstitial pores; 5 percent smooth nonporous irregular iron concretions 1 to 2.5 centimeters in size; extremely acid (pH 4.0, 1:1 in water); clear smooth boundary. (8 to 25 centimeters thick); lab sample number 80P00028

BA—10 to 28 centimeters (4 to 11 inches); strong brown (7.5YR 4/6) silty clay; moderate fine and medium subangular blocky structure parting to moderate very fine subangular blocky; firm, moderately sticky and moderately plastic; common very fine and fine roots; many very fine tubular and interstitial pores; 5 percent smooth nonporous irregular iron concretions 1 to 2.5 centimeters in size; 1 percent basalt cobbles ; two fragments of prehistoric pottery at the upper boundary of the horizon; few fragments of charcoal; very strongly acid (pH 4.6, 1:1 in water); clear wavy boundary. (10 to 20 centimeters thick); lab sample number 80P00029

Bo1—28 to 56 centimeters (11 to 22 inches); 70 percent yellowish red (5YR 4/6) and 30 percent strong brown (7.5YR 4/6) silty clay; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots; many very fine and fine tubular and interstitial pores; common pressure faces and many thin waxy coatings on faces of peds and on surfaces along pores; 5 percent smooth nonporous irregular iron concretions 1 to 2.5 centimeters in size; one vesicular irregular iron concretion; 2 percent saprolite fragments 1 to 2.5 centimeters in size; few fragments of charcoal; very strongly acid (pH 4.7, 1:1 in water); diffuse wavy boundary. (10 to 30 centimeters thick); lab sample number 80P00030

Bo2—56 to 79 centimeters (22 to 31 inches); 80 percent yellowish red (5YR 4/6) and 20 percent strong brown (7.5YR 4/6) silty clay; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots; many very fine and fine tubular and interstitial pores; common pressure faces and many thin waxy coatings on faces of peds and on surfaces along pores; 5 percent pendants 0.5 centimeter in diameter and 5 centimeters long; few fragments of charcoal; very strongly acid (pH 4.9, 1:1 in water); clear wavy boundary. (10 to 71 centimeters thick); lab sample number 80P00031

Bo3—79 to 107 centimeters (31 to 42 inches); 80 percent strong brown (7.5YR 4/6) and 20 percent yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots; many very fine and fine tubular, interstitial, and vesicular pores; common pressure faces and many thin waxy coatings on faces of peds and on surfaces along pores; 5 percent smooth nonporous irregular iron concretions 1 to 2.5 centimeters in size; strongly acid (pH 5.2, 1:1 in water); gradual wavy boundary. (0 to 30 centimeters thick); lab sample number 80P00032

BC—107 to 150 centimeters (42 to 59 inches); 50 percent red blotches of (10R 4/8) silt loam with parallel stringers that are 25 percent brownish yellow (10YR 6/8) and 10 percent strong brown (7.5YR 4/6); many light gray (2.5YR 7/1) specks and strong brown (7.5YR 4/6) waxy coatings; moderate medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine

roots in peds and on faces of peds; common very fine and fine vesicular pores in peds; between peds, common very fine and fine tubular pores with waxy coatings; continuous moderately thick and thick waxy coatings on faces of peds; strongly acid (pH 5.3, 1:1 in water). (0 to 100 centimeters thick); lab sample number 80P00033

Range in characteristics

Soil moisture regime class: Perudic
Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months
Mean annual soil temperature: 28 degrees C (83 degrees F)
Control section: 25 to 100 centimeters (10 to 39 inches)
Thickness of the solum: 50 to 150 centimeters (20 to 39 inches)
Linear extensibility: 6 to 8.7 percent; weighted average, 5.5 percent
Surface rock fragments: Petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles.

A, Ap, and AB horizon(s):
Hue—7.5YR or 10YR
Value—3 or 4 moist
Chroma—3 or 4 moist
Texture—silt loam, silty clay loam, or silty clay
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 4.8 to 5.1
New Zealand P retention—40 to 65 percent
Aluminum saturation—75 to 85 percent
Content of organic matter—9.0 to 12.0 percent

Bo horizon(s):
Hue—2.5YR, 5YR, or 7.5YR
Value—4 moist
Chroma—4 or 6 moist
Texture—silt loam, silty clay loam, or silty clay
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 5.1 to 5.6
New Zealand P retention—35 to 65 percent
Aluminum saturation—75 to 95 percent
Content of organic matter—0.8 to 2.5 percent

C, BC, CB, CBt, and BCt horizon(s):
Hue—10R, 2.5YR, 5YR, 7.5YR, or 10YR
Hue of clay coatings—7.5YR or 10YR
Hue of saprolite—2.5Y, 5GY, or 5Y
Value—3 to 5 moist
Chroma—3 to 8 moist
Value of saprolite—6 to 8 moist
Chroma of saprolite—1 to 3 moist
Texture—silty clay, clay, silty clay loam, or loam
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles

Reaction—pH of 5.1 to 5.5
New Zealand P retention—50 to 65 percent
Aluminum saturation—85 to 90 percent
Content of organic matter—0.5 to 0.6 percent

Peleliu Series

Map units: 645 (fig. 35), 646, 647
Depth class: Shallow
Drainage class: Well drained
Most limiting permeability (Ksat): 3.6-36 cm/hr (1.42-14.17 in/hr); high
Landform: Solution platforms, wave-cut platforms, karrens
Landscape: Raised coralline platform islands
Hillslope position: Toeslopes, backslopes, footslopes, summits, shoulders
Geomorphic position: Side slopes, base slopes
Parent material: Coralline colluvium over limestone residuum and probably additions of volcanic ash and tropospheric dust; the bedrock includes the Peleliu and Palau Limestone Formations
Elevation: 1 to 33 meters (3 to 108 feet)
Slope: 0 to 150 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Clayey-skeletal, carbonatic, isohyperthermic Lithic Haprendolls

Typical pedon

Peleliu highly organic extremely cobbly silt loam on a south-facing, linear/convex slope of 85 percent, under a limestone-forest plant community, at an elevation of 7 meters (23 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on September 12, 2006, the soil was moist throughout. About 15 percent of the surface is covered by gravel, 60 percent by cobbles, and 10 percent by stones. The fragments are coralline limestone. The average distance between the stones is 5 meters (16 feet). About 3 percent of the surface is bare ground.

Type location.—Ngeruktabel Island, Republic of Palau; on the southwest end of the island in an area called "Bkul a Ngchus"; on the northern side of a short peninsula is a low sandy beach terrace; from the beach, at the boundary of the southwest end of the sandy area with a limestone upland, proceed southeast about 34 meters (112 feet) and go southwest upslope 24 meters (79 feet); 430,416 meters E., 798,442 meters N., UTM zone 53; latitude 7 degrees 13 minutes 22.54 seconds N. and longitude 134 degrees 22 minutes 10.96 seconds E.; WGS 84.

Oe—0 to 5 centimeters (0 to 2 inches); black (10YR 2/1) extremely cobbly moderately decomposed plant material; about 20 percent fiber rubbed; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many very fine and fine dendritic tubular pores; rock fragments occurring as coralline limestone; 15 gravel, 60 percent cobbles, and 10 percent stones; moderately acid (pH 5.6, 1:1 in water); broken irregular boundary. (1 to 8 centimeters thick)

A—5 to 15 centimeters (2 to 6 inches); black (10YR 2/1) highly organic extremely cobbly silt loam; grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable, slightly sticky and moderately plastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; rock fragments occurring as coralline limestone; 15 percent gravel, 60 percent cobbles, and 10 percent stones; common thin organic stains on rock fragments; slightly

Figure 35.—Peleliu soils are shallow over limestone. White limestone bedrock is exposed at the bottom of this soil pit. The soil is Peleliu extremely cobbly clay loam, 0 to 4 percent slopes (map unit 645), in an area of Peleliu State, Peleliu Island.

alkaline (pH 7.8, 1:1 in water); broken irregular boundary. (8 to 20 centimeters thick); lab sample number 07N00529

Bw—15 to 27 centimeters (6 to 11 inches); very dark grayish brown (10YR 3/2) highly organic extremely cobbly silty clay loam; moderate very fine and fine subangular blocky structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium and few coarse roots; rock fragments occurring as coralline limestone; 5 percent gravel, 65 percent cobbles, and 15 percent stones; common thin and moderately thick clay films and organic stains on rock fragments; moderately alkaline (pH 8, 1:1 in water); broken irregular boundary. (0 to 41 centimeters thick); lab sample number 07N00530

R—27 centimeters (11 inches); coralline limestone with crystal structure apparent in freshly exposed face, white (10YR 8/1) interior; fractured at intervals of 10 centimeters (4 inches) or more; indurated; strongly alkaline (pH 8.6, 1:1 in water)

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months

Mean annual soil temperature: 27 degrees C (81 degrees F)

Depth to lithic bedrock: 20 to 50 centimeters (8 to 20 inches)

Linear extensibility: 1 to 3 percent; weighted average, 1.5 percent

Surface rock fragments: Hard, angular coralline limestone; 15 to 85 percent total rock fragments; 15 to 50 percent gravel; 0 to 80 percent cobbles; 0 to 20 percent stones; 0 to 10 percent boulders; the average distance between the stones is about 5 meters (16 feet), and that between the boulders is about 15 meters (49 feet.)

Oi, Oe, and Oa horizon(s):

Hue—10R, 2.5YR, 5YR, 7.5YR, or 10YR

Value—2 to 3 moist
Chroma—1 moist
In lieu texture—slightly decomposed plant material or moderately decomposed plant material that is very cobbly or extremely cobbly
Size and content of rock fragments—hard, angular coralline limestone; 35 to 90 percent total rock fragments; 10 to 50 percent gravel; 10 to 50 percent cobbles; 5 to 15 percent stones
Calcium carbonate equivalent—0 to 5 percent
Reaction—pH of 5.1 to 7.3
Cation-exchange capacity—135 to 180 meq/100grams
Content of organic matter—16 to 30 percent

A horizon(s):
Hue—7.5YR or 10YR
Value—2.5 to 5 moist
Chroma—1 to 3 moist
Texture—clay loam that in some pedons is cobbly or very cobbly and highly organic
Size and content of rock fragments—hard, angular coralline limestone; 30 to 90 percent total rock fragments; 15 to 50 percent gravel; 10 to 40 percent cobbles; 5 to 15 percent stones
Calcium carbonate equivalent—70 to 95 percent
Reaction—pH of 7.2 to 8.0
New Zealand P retention—50 to 65 percent
Content of organic matter—12 to 16 percent

Bw horizon(s):
Hue—7.5YR or 10YR
Value—2.5 to 5 moist
Chroma—2 to 6 moist
Texture—clay loam or loam that is highly organic and very cobbly or extremely cobbly
Size and content of rock fragments—hard, angular coralline limestone; 35 to 90 percent total rock fragments; 10 to 50 percent gravel; 10 to 50 percent cobbles; 5 to 15 percent stones
Calcium carbonate equivalent—70 to 95 percent
Reaction—pH of 7.8 to 8.2
New Zealand P retention—50 to 65 percent
Content of organic matter—6 to 14 percent

Tabecheding Series

Map units: 648 (fig. 36), 649, 651
Depth class: Very deep
Drainage class: Somewhat poorly drained
Most limiting permeability (Ksat): 0.0036-0.036 cm/hr (0.0015-0.014 in/hr); low
Landform: Erosional crests and ridges on hills
Landscape: Volcanic islands
Hillslope position: Backslopes, shoulders, summits
Geomorphic position: Crests, side slopes
Parent material: Interbedded, clays, silty clays, and lignite from marine deposits (fig. 37) derived from volcanic rock; includes the Airai Clay Formation
Elevation: 3 to 62 meters (10 to 203 feet)
Slope: 2 to 30 percent

Figure 36.—A soil pit with a water table at a depth of about 10 centimeters (4 inches) in an area of Tabecheding silty clay loam, 2 to 6 percent slopes, (map unit 648), on a marine terrace in Ngatpang State, Babeldaob Island. Septic tank absorption fields are likely to fail when installed on soils with a high water table. Soils in bottom lands and on marine terraces are likely to have a high water table. The States on Babeldaob with the greatest area of marine terrace soils are Airai, Aimeliik, and Ngatpang.

Climatic data

Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)

Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, halloysitic, isohyperthermic Aquic Kandiperox

Typical pedon

Tabecheding silty clay loam on an east-facing, convex/linear slope of 5 percent, under lowland forest and wetland savannah plant communities, at an elevation of 33 meters (105 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on October 1, 1979, the soil was moist throughout. About 3 percent of the surface is covered by gravel consisting of gibbsite concretions. About 5 percent of the surface is bare ground.

Type location.—Airai Municipality, Babelthuap Island, Republic of Palau; about 930 meters (3,050 feet) east and 180 meters (591 feet) south of the southeast end of the dam at Ngerimel Reservoir; N. on the road to Nekken about 1.5 kilometers (0.932 mile) past a water tank, continue on road about one-half the distance to the bottom of the hill beyond first 90-degree left turn, then turn right 90 degrees and proceed 182 meters (597 feet); 446,866 meters E., 831,341 meters N., UTM zone 53;. latitude 7 degrees 22 minutes 23.51 seconds N. and longitude 134 degrees 32 minutes 38.03 seconds E.; WGS 84.

A—0 to 18 centimeters (0 to 7 inches); 70 percent olive brown (2.5Y 4/4) and 30 percent light olive brown (2.5Y 5/4) silty clay loam; moderate fine granular

Figure 37.—Tabecheding soils formed in marine terrace sediments. They have a high water table, which is indicated by reddish iron concentrations between depths of 30 and 50 centimeters. The Tabecheding soil in this photo is an inclusion in an area of Ngatpang silty clay loam, 2 to 6 percent slopes (map unit 624), in Aimeliik State, Babeldaob Island.

structure in the upper 2.3 centimeters (0.9 inch)over moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; common fine interstitial and tubular and many very fine tubular pores; many fine and medium faint light olive brown (2.5Y 5/4) iron depletions in the matrix; 3 percent quartz fine gravel; extremely acid (pH 4.0, Hellige-Truog); clear smooth boundary. (13 to 18 centimeters thick); lab sample number 80P00450

Bto1—18 to 36 centimeters (7 to 14 inches); brownish yellow (10YR 6/6)clay; 1 percent fine distinct light brownish gray (10YR 6/2) and 1 percent fine faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular and angular blocky; friable, moderately sticky and moderately plastic; common very fine and fine roots; many very fine and common fine tubular pores (within interstices) and vesicular pores; common thin coatings on faces of peds and lining tubular pores; many pressure faces; few fine distinct light brownish gray (10YR 6/2) iron depletions and few fine faint yellowish brown (10YR 5/6) masses of iron in the matrix; extremely acid (pH 4.0, Hellige-Truog;); clear irregular boundary. (15 to 25 centimeters thick); lab sample number 80P00451

Bto2—36 to 51 centimeters (14 to 20 inches); brownish yellow (10YR 6/6) clay; 1 percent fine distinct yellowish red (5YR 4/6), 11 percent fine distinct yellowish brown (10YR 5/8), and 30 percent fine distinct light gray (10YR 7/2) mottles; weak medium prismatic structure parting to moderate very fine and fine angular blocky; firm, moderately sticky and moderately plastic; few very fine, fine, and medium roots; many very fine and fine tubular and vesicular pores; common pressure faces on peds and, when moist, few faint coatings on faces of peds; many fine distinct light gray (10YR 7/2) iron depletions, common fine distinct yellowish brown (10YR 5/8) masses of iron, and few fine distinct yellowish red (5YR 4/6) masses of iron in

the matrix; extremely acid (pH 4.0, Hellige-Truog); gradual irregular boundary. (5 to 20 centimeters thick.)

BCt—51 to 86 centimeters (20 to 34 inches); very pale brown (10YR 7/3) (interior) clay; 1 percent coarse prominent red (2.5YR 4/6) and 11 percent medium distinct yellowish brown (10YR 5/8) mottles; weak medium and coarse prismatic structure; few very fine and fine and few medium roots; many very fine and fine interstitial and tubular pores; common pressure faces on peds; common medium distinct yellowish brown (10YR 5/8) masses of iron and few medium prominent red (2.5YR 4/6) masses of iron in the matrix; extremely acid (pH 4.0, Hellige-Truog); clear smooth boundary. (20 to 51 centimeters thick); lab sample number 80P00452

CBt—86 to 104 centimeters (34 to 41 inches); reddish gray (5YR 5/2) (interior) clay; 20 percent medium distinct strong brown (7.5YR 5/8) and 10 percent reddish black (7.5R 2.5/1) mottles; weak medium and coarse prismatic structure; firm, moderately sticky and moderately plastic; few very fine and fine roots; common very fine interstitial and tubular pores; common pressure faces on peds; 5 percent black (7.5YR 2/1) lignite pararock gravel; common medium distinct strong brown (7.5YR 5/8) masses of iron in the matrix; extremely acid (pH 4.0, Hellige-Truog); abrupt smooth boundary. (0 to 25 centimeters thick.)

2Cg—104 to 157 centimeters (41 to 62 inches); 60 percent dark gray (10YR 4/1) and 40 percent very dark gray (10YR 3/1) very paragravelly clay; moderate medium platy structure parting to strong thin platy; firm, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine interstitial and tubular pores; when moist, few clay films in root channels and/or pores; common finely interbedded very dark gray (10YR 3/1) lignite pebbles; lignite bed is tilted at a 6-degree dip to the south and a 14-degree dip to the east-by-northeast; ultra acid (pH 3.2, Hellige-Truog). (0 to 60 centimeters thick)

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 27 degrees C (81 degrees F)

Thickness of the solum: 38 to 104 centimeters (15 to 41 inches).

Linear extensibility: 6 to 17 percent; weighted average, 10.6 percent

Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles;

Seasonal high water table: Occurring in all months of the year; depth to the top of the water table—35 to 50 centimeters (14 to 20 inches)

A horizon(s):

Hue—10YR, 2.5Y, or 5Y

Value—3 or 4 moist

Chroma—2 to 4 moist

Texture—silty clay, silty clay loam, silt loam, or clay

Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 5 percent total rock fragments; 0 to 3 percent gravel; 0 to 2 percent cobbles

Reaction—pH of 3.6 to 5.0

New Zealand P retention—30 to 60 percent

Aluminum saturation—36 to 70 percent

Content of organic matter—3 to 5 percent

Bto horizon(s):

Hue—10YR, 2.5Y, or 5Y

Value—5 to 7 moist

Chroma—2 to 6 moist
Texture—cobbly silty clay or very cobbly silty clay
Size and content of rock fragments—petroferric fragments, lignite, ironstone, and gibbsite concretions; 0 to 30 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 3.6 to 4.4
New Zealand P retention—35 to 65 percent
Aluminum saturation—75 to 95 percent
Content of organic matter—0.6 to 1.5 percent

BCt, CBt, and C horizon(s):
Hue—2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y
Value—3 to 7 moist
Chroma—1 to 4 moist
Texture—silty clay or clay
Size and content of rock fragments—petroferric fragments, lignite, ironstone, and gibbsite concretions; 0 to 5 percent total rock fragments; 0 to 3 percent gravel; 0 to 2 percent cobbles
Reaction—pH of 3.6 to 4.4
New Zealand P retention—75 to 90 percent
Aluminum saturation—30 to 50 percent
Content of organic matter—0.1 to 0.8 percent

2Cg horizon(s):
Hue—2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y
Value—3 to 7 moist
Chroma—1 to 4 moist
Texture—very paragravelly silty clay, silty clay, or paragravelly silty clay
Size and content of rock fragments—petroferric fragments, lignite, ironstone, and gibbsite concretions; 0 to 5 percent total rock fragments; 0 to 3 percent gravel; 0 to 2 percent cobbles
Reaction—pH of 2.3 to 3.4
New Zealand P retention—75 to 90 percent
Aluminum saturation—1 to 4 percent
Content of organic matter—0.0 to 0.4 percent

Typic Udorthents

Map units: 612, 613, 614, 620, 621, 653, 654
Depth class: Very deep
Drainage class: Well drained
Most limiting permeability (Ksat): 0.360-3.6 cm/hr (0.142-1.42 in/hr); moderately high
Landform: Scalped areas, erosional crests and ridges on hills
Landscape: Volcanic islands
Hillslope position: Summits, shoulders, backslopes
Geomorphic position: Side slopes, crests
Parent material: Bauxite (aluminum ore) composed of saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff; human-transported material derived from either saprolite volcanic rocks or limestone; and saprolite derived from basalt, andesite, dacite, volcanic breccia, bedded tuff, or other tuff
Elevation: 4 to 179 meters (13 to 587 feet)
Slope: 0 to 75 percent

Climatic data
Mean annual precipitation: 3,300 to 4,650 millimeters (130 to 183 inches)
Mean annual air temperature: 27.0 degrees C (81 degrees F)

Taxonomic class: Very-fine, parasesquic, acid, isohyperthermic Typic Udorthents

Typical pedon

Typic Udorthents very gravelly silty clay loam on an east-facing, convex slope of 4 percent, in an area of bare ground and a fern-land plant community, at an elevation of 108 meters (354 feet). Colors are for moist soil unless otherwise noted. All textures are apparent field textures. When described on September 7, 2006, the soil was moist throughout. About 80 percent of the surface is covered by gravel consisting of petroferric fragments, ironstone, and gibbsite concretions. About 60 percent of the surface is bare ground.

Type location.—Airai Municipality, Babeldaob Island, Republic of Palau; about 1,870 meters (6,140 feet) southeast of Ngethong Municipality; 453,945 meters E., 839,342 meters N., UTM zone 53; latitude 7 degrees 35 minutes 35 seconds N. and longitude 134 degrees 34 minutes 57 seconds E.; WGS 84.

A—0 to 2 centimeters (0 to 1 inch); strong brown (7.5YR 4/6) very gravelly silty clay loam, brown (7.5YR 5/4) dry; moderate very fine and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine tubular pores within interstices; 50 gravel gibbsite pendants and ironstone concretions; extremely acid (pH 4.3, 1:1 in water); clear wavy boundary. (0 to 5 centimeters thick)

AC—2 to 12 centimeters (1 to 5 inches); 40 percent red (2.5YR 4/6) and 30 percent yellowish red (5YR 4/6) very gravelly silty clay; 30 percent variegated dark red (10R 3/6) and red (10R 4/8) saprolite that has common fine greenish gray (5GY 6/1) and light greenish gray (5GY 7/1) specks of feldspar; moderate medium and coarse subangular blocky structure parting to moderate very fine and fine angular blocky; rock structure in the saprolite; firm, moderately sticky and moderately plastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; many thin clay coatings on faces of peds and lining pores; 50 gravel gibbsite pendants and ironstone concretions; very strongly acid (pH 4.5, 1:1 in water); gradual irregular boundary. (0 to 20 centimeters thick)

C—12 to 200 centimeters (5 to 79 inches); 50 percent weak red (10R 4/4) and 50 percent yellowish red (5YR 4/6) silty clay loam; many fine greenish gray (6/5GY, 6/5BG) specks of feldspar; moderate medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots within peds; common very fine tubular pores in interstices between peds; common thin clay coatings on faces of peds and lining pores; 4 percent gravel ironstone and gibbsite concretions; very strongly acid (pH 4.5, 1:1 in water).

Range in characteristics

Soil moisture regime class: Perudic

Seasonal precipitation pattern: Precipitation generally is evenly distributed during the year. February, March, and April are the driest months.

Mean annual soil temperature: 28 degrees C (83 degrees F)

Linear extensibility: 3 to 7 percent; weighted average, 4.8 percent

Surface rock fragments: Vesicular petroferric fragments, ironstone, and gibbsite concretions; 20 to 95 percent total rock fragments; 20 to 80 percent gravel; 0 to 15 percent cobbles

A horizon(s):

Hue—5YR, 7.5YR, or 10YR

Value—3 or 4 moist

Chroma—2 to 6 moist

Texture—loam or silty clay loam that is gravelly or very gravelly in some pedons

Size and content of rock fragments—petroferric fragments, ironstone, and gibbsite concretions; 0 to 35 percent total rock fragments; 0 to 35 percent gravel; 0 to 10 percent cobbles
Reaction—pH of 4.9 to 5.5
New Zealand P retention—50 to 60 percent
Aluminum saturation—55 to 70 percent
Content of organic matter—1 to 4 percent

C, BC, CB, CBt, and BCt horizon(s):
Hue—10R, 2.5YR, 5YR, 7.5YR, or 10YR
Hue of clay coatings—7.5YR or 10YR
Hue of saprolite—2.5Y, 5GY, or 5Y
Value—3 to 5 moist
Chroma—3 to 8 moist
Value of saprolite—6 to 8 moist
Chroma of saprolite—1 to 3 moist
Texture—silty clay, clay, silty clay loam, or loam
Size and content of rock fragments—petroferric fragments, tuff, ironstone, and gibbsite concretions; 0 to 15 percent total rock fragments; 0 to 15 percent gravel; 0 to 15 percent cobbles
Reaction—pH of 5.1 to 5.5
New Zealand P retention—50 to 65 percent
Aluminum saturation—85 to 90 percent
Content of organic matter—0.5 to 0.6 percent

Formation of the Soils

By Robert T. Gavenda and Christopher W. Smith, Natural Resources Conservation Service.

Soil is generally defined as a natural three-dimensional body at the Earth's surface that is a growing medium for plants. Soil is made up of organic and mineral material, air, and water. The characteristics and properties of soils are determined by physical and chemical processes that result from the interaction of five soil-forming factors. These factors are climate, living organisms, parent material, topography, and time (Jenny, 1941). Parent material is the organic or mineral material in which the soils formed. Climate refers not only to the overall macroclimate (temperature and rainfall) but also to the internal soil climate, such as waterlogging in soils on valley bottoms, and relatively dry soil conditions resulting from excessive drainage in beach sands. Living organisms are the plants and animals living, burrowing, mixing, and decaying in the soil and the micro-organisms that decompose organic material. Also, humans can have a significant impact on soils. Topography refers to the shape of the land, mainly as it affects water movement and thus influences drainage, aeration, and erosion. Also, landforms affect exposure to the sun and wind. Time refers to the duration that the other factors have influenced soil formation. Variation in the soil-forming factors across the landscape accounts for the different kinds of soil and their distribution.

Soils are not distributed randomly across the landscape. The result of the interaction of the soil-forming factors affecting soil-forming processes is an ordered mosaic of soils across the landscape with different properties and different behavior with respect to different uses. Soil management should take the variation in soil properties into account. The geographic order represented by the distribution of soils can be discovered by soil survey techniques that examine soils and correlate them with landscapes. The factors of soil formation in a soil survey area guide those investigations.

The factors of soil formation affect the intensity of the processes of soil formation, which are additions, losses, transformations, and translocations (Simonson, 1959). An addition occurs when organic matter is added to the soil by way of mulching to prevent excessive soil erosion. Another example is the addition of sediment eroded from higher areas on the landscape. Losses can be erosion of topsoil through poor soil management or the leaching of plant nutrients from the soil. Raw organic matter is transformed into decomposed organic matter (humus) through the action of micro-organisms. Rock minerals are transformed into soil minerals through the loss of silica and other rock-forming elements, resulting in the accumulation of iron and aluminum (bauxite). Soluble compounds, such as plant nutrients, can be moved or translocated within a soil. Clay particles can be translocated from the topsoil to the subsoil.

Soils are classified on the basis of measured, observed, and inferred physical and chemical properties. They are mapped and interpreted on the basis of various kinds of soil horizons and their arrangement. The degree and expression of the soil horizons reflect the extent of the interaction of soil-forming factors with one or more soil-forming processes. Important diagnostic surface horizons in this survey area include mollic epipedons (dark surface horizons), and the significant diagnostic subsurface horizons include oxic, cambic, and argillic horizons. The Glossary defines these diagnostic horizons.

Climate

Palau has a warm, humid tropical climate. Most of the year is rainy, but there is a drier season between February and April. A warm climate throughout the year favors rapid chemical and physical reactions and the decomposition of organic material from plants and animals. Temperature and rainfall, which vary only slightly within the survey area, partially govern the rate at which rocks weather and the decomposition of minerals. More specific information about the climate is given in the section “General Nature of the Survey Area.”

Living Organisms

Plants, animals, fungi, and bacteria are important to soil formation. The changes they bring about depend mainly on the kind of life processes peculiar to each. Originally, most of the soils in the survey area were covered by dense tropical forest. Some areas were burned and cleared for cultivation and other uses. When these areas were left idle, savannah vegetation became dominant. Repeated burning and removal of the savannah vegetation and subsequent erosion further depleted Babelthuap, Ngardmau, and other soils, so that now some areas support only deteriorated savannah vegetation. Burning has clearly altered the physical and chemical properties of these soils.

The vegetation generally determines the amount of organic matter in the soil, the color of the surface layer, and the amount of nutrients. Growing plants provide a cover that helps to control erosion and stabilize the surface so that soil-forming processes can continue. Plants recycle nutrients, and plants roots intercept many nutrients being released into the soil before they can be leached through the soil and lost. Leaves, twigs, and entire plants accumulate on the surface of the soil and then decompose as a result of the activity of micro-organisms, earthworms, and other forms of animal life. The plant roots leave pores, widen cracks in the rocks, and thus permit more water to enter the soil. Also, the uprooting of trees influences soil formation by mixing the soil layers and loosening the underlying material.

Earthworms, ants, and many other burrowing animals are active in the survey area. They help to keep the soils open and porous, mix the layers of the soil, mix organic matter in the soil, and help to break down the remains of plants. Earthworms and other small invertebrates feed on organic matter in the upper few centimeters of the soil. They slowly but continually mix the soil material and, in places, alter it chemically. Bacteria, fungi, and other micro-organisms hasten the weathering of rock minerals and the decay of organic matter.

Human activities have influenced the formation of several soils in the survey area. Some of these activities resulted in permanent chemical and physical modification of the soils.

Parent Material

Parent material is the organic or mineral material in which soils form. It largely determines the chemical and mineralogical composition of mineral soils. The minerals in the parent material generally determine the kind and amount of clay in the soils. Some of the soils on uplands in the survey area, such as Aimeliik, Babelthuap, Ngardmau, and Palau soils, formed in place from the weathering of extrusive volcanic rocks, such as lava, tuff, and tuffaceous breccia. These soils have a high content of tubular halloysite clay, which strongly influences the physical and chemical properties of the soils, which in turn influence engineering and agronomic practices. Other soils, such as those in the Dechel series, formed in alluvial deposits washed from the upland soils and deposited on valley bottoms. Still others, such as those in the Ngedebus and Majuro series, formed in coralline sandy material. Peleliu series formed in material

weathered from coral limestone. All of the soils on old landscapes probably have additions of volcanic ash from Indonesia and the Philippines and possibly tropospheric dust from the deserts of central Asia.

Most organic soils formed in areas where organic matter accumulated because water saturation inhibited decomposition of the organic matter. The survey area includes organic soils in areas of freshwater. These soils are suitable for wetland taro. Examples are Mesei and Odesangel soils. The survey area also includes organic soils in areas of saltwater. These soils support mangrove forest. Examples are Chia and Ilachetomel soils. Chelbacheb soils also are organic, but they are well drained and formed in accumulated plant debris deposited in depressions in areas of limestone.

Topography

The shape of the land surface, slope, and depth to the water table have had a great influence on the formation of the soils in the survey area. Strongly sloping to steep soils, in areas where runoff is moderate to rapid, generally are well drained and have a bright red subsoil, indicating that iron compounds are oxidized. Soils on bottom lands, such as Dechel and Tabecheding soils, have a water table at or near the surface for long periods. These soils exhibit marked evidence of wetness in the form of rust-colored iron concentrations and gray colors where iron has been removed. In some areas the subsoil has a yellowish color because of hydrated iron minerals. Thick accumulations of organic matter can be another sign of wetness.

Soils formed on five major landscapes in Palau. These are volcanic uplands, marine terraces, bottom lands, limestone uplands, and areas of coral sand. Each landscape is correlated with a particular parent material and distinctive landforms.

The islands of Babeldaob, Koror, Arakabesan, and Malakal are high volcanic islands. The islands formed from volcanic accumulation along the crest of the Palau Ridge (U.S. DOD, 1956). Marine emergences and submergences and stream erosion later modified the volcanic rocks. The resulting landscape is hilly and highly dissected by streams. High year-round temperatures combined with abundant rainfall over long periods of time have caused extensive chemical decomposition of volcanic rock minerals into soil minerals with the accompanying loss of soil nutrients. The volcanic bedrock has been significantly altered to saprolite to a great depth.

Aimeliik, Palau, Babelthuap, and Ngardmau soils are the major soils on the volcanic uplands. Several soil scientists who have worked in Palau (Smith and Babik, 1988) believed these soil series were essentially the same soil before humans arrived in Palau and cleared the forest. Fire used to clear land has caused loss of organic matter and nutrients and has disrupted the nutrient cycle. Removal of vegetation by fire has also led to erosion on ridgetops. Babelthuap and Ngardmau soils are on these ridgetops. These soils are nutrient poor, and vegetation has difficulty becoming established and thriving on them. These are the most degraded soils on the island of Babeldaob. Palau soils are less degraded and support savanna vegetation. The forested Aimeliik soils are the most fertile of the volcanic soils. Nutrient cycling has been disrupted the least on these soils.

Marine terraces formed as sediment from upslope areas accumulated in near-shore environments and formed bedded marine clay. Subsequent emergence of the terraces either by tectonic uplift of the Palau landmass or by lowering of the sea level left the terraces high and dry and subject to erosion and soil formation. The terraces are generally slightly sloping planar surfaces but are dissected by stream erosion. Ngatpang and Tabecheding soils occur on the terraces.

Bottom lands are on valley bottoms or other low-lying landscapes where water cannot drain freely into streams or the ocean. The soils on bottom lands are generally wet and saturated for at least part of the year. The wetness influences the formation of these soils. Soils on bottom lands can be mineral or organic soils. Dechel and Ngersuul soils, which formed in water-deposited sediment, are examples of mineral

soils. Organic soils formed in vegetation that accumulated because saturation inhibited decomposition. Examples of the organic soils on bottomland are Mesei and Odesangel soils in freshwater environs and Chia and Ilachetomel soils in areas of brackish water.

Limestone forms low platform islands, such as Peleliu and Angaur and the mostly higher and steeper Rock Islands. The limestone generally is porous and has about 97 percent calcium carbonate (US DOD, 1956). The features of the karst topography include pits and pinnacles, caves, depressions, and sinkholes resulting from the dissolution of the calcium carbonate. Soils in areas of limestone are characteristically thin, generally less than 50 centimeters (20 inches) thick. Peleliu soils are the most common mineral soils in these areas. The organic Chelbacheb soils occur in numerous small depressions in the limestone.

Soils that formed in coralline sandy material are generally adjacent to the shoreline. Areas of these soils are generally long and narrow. They are inland of the beach or on rocks above the high tide and are mainly less than 1 meter to 2 meters above sea level. These areas are occasionally exposed to salt spray and brackish ground water. The coralline sandy material consists of pulverized fragments of shells, coral, and calcareous algae. The soils in the beach deposits are generally sandy. Examples are Ngedebus soils. Majuro soils are sandy and have cobbles. On atolls, the sandy Ngedebus soils generally are on the lagoon side of the island and the cobbly Majuro soils are on the oceanside, which is subject to more wave action during storms.

Time

Except for the accumulation of organic matter, a long period of time generally is needed for changes to take place in the parent material. The soils in the survey area range from young soils that exhibit little or no development to older soils that exhibit very pronounced development. The sandy Ngedebus soils and the Dechel soils on bottom lands are examples of young soils. Palau and Babelthuap soils, which are in areas on uplands of volcanic islands where the parent material has weathered in place for a long time, are examples of older soils.

The volcanic deposits date to the Eocene (34 to 56 mya) and probably Oligocene (24 to 34 mya) (US DOD, 1956). The marine terrace deposits rest on volcanic rocks and date to the Miocene (5.5 to 24 mya). These deposits consist of interbedded clays and lignite, a low-grade form of coal. Limestone in Palau consists of raised reef and lagoonal coralline deposits and ranges in age from Miocene (5.5 to 24 mya) to Pleistocene (2.6 to 5.5 mya). Coral sands are all of recent age. The great ages of some of the rocks does not mean that the landscapes and soils can be considered that old. All geomorphic surfaces and soils are considerably younger than the ages of the rocks. The ages of the soils have not been determined.

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Glossary

AASHTO classification. A system for classifying soils specifically for geotechnical engineering purposes that is related to highway and airfield construction. It is based on particle-size distribution and Atterberg limits.

AASHTO group index (GI). An empirical index number used to evaluate clayey and silty clay material.

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Agroforestry. A multistory cropping system consisting of food-producing plants, such as bananas and breadfruit, mixed with trees that do not produce food.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Aluminum saturation. The amount of KCl-extractable Al divided by extractable bases (extracted by ammonium acetate) plus the KCl-extractable Al. It is expressed as a percent. A general rule of thumb is that if there is more than 50 percent Al saturation, Al problems in the soil are likely. The problems may not be related to Al toxicity but to a deficiency of calcium and/or magnesium.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Anthropogenic feature. An artificial feature on the Earth’s surface (including those in shallow water), having a characteristic shape and range in composition, composed of unconsolidated earthy, organic materials, artificial materials, or rock, that is the direct result of human manipulation or activities; can be either constructional (e.g., artificial levee) or destructional (quarry).

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Atoll. A roughly circular coral reef surmounted by a chain of closely spaced, low coral islets that encircle or nearly encircle a shallow lagoon in which there is no land or islands of non-coral origin; the reef is surrounded by open sea.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at

wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Barrier island. A long, narrow, sandy island that is above high tide and parallel to the shore. It commonly has dunes, vegetated zones, and swampy or marshy terrains extending lagoonward from the beach.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basalt. A dark mafic igneous rock.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bauxite. A residual rock-weathering product consisting of hydrated aluminum oxides; the principal commercial source of aluminum.

Beach ridge. A low, essentially continuous mound of beach or beach-and-dune material heaped up by the action of waves and currents on the backshore of a beach, beyond the present limit of storm waves or the reach of ordinary tides, and occurring singly or as one of a series of approximately parallel deposits. The ridges are roughly parallel to the shoreline and represent successive positions of an advancing shoreline.

Bedded. Formed, arranged, or deposited in layers or beds or made up of or occurring in the form of beds; especially said of a layered sedimentary rock, deposit, or formation.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bog. Waterlogged, spongy ground consisting primarily of mosses, supporting acidic, decaying vegetation, such as sphagnum, sedges, and heaths, that may develop into peat.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cambic horizon. A mineral soil horizon that is loamy very fine sand or finer textured, has soil structure rather than rock structure, and contains some weatherable minerals. It is characterized by the alteration or removal of mineral material, as indicated by mottling or gray color, stronger chroma or redder hue than the underlying horizons, or the removal of carbonates. The cambic horizon is not cemented or indurated and has too little evidence of illuviation to meet the requirements of an argillic horizon.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Consociation. A map unit made up of one dominant component.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coral island. a) A relict coral reef that stands above sea level and is surrounded by water. Carbonate sands rich in coral and shell fragments generally mantle the underlying flat coral platform. b) An oceanic island formed from coral accumulations lying on top of or fringing volcanic peaks or platforms.

Coral sands. Well sorted, sand-sized, clastic material transported and deposited primarily by wave action and deposited in a shore environment from coral.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crest. A geomorphic component of hills consisting of the convex slopes (perpendicular to the contour) that form the narrow, roughly linear top area of a hill, ridge, or other upland where shoulders have converged to the extent that little or no summit remains; dominated by erosion, slope wash, and mass-movement processes and sediments (e.g., slope alluvium, creep). Commonly, soils on crests are more similar to soils on side slopes than to soils on adjacent interfluves.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply of water, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Extractable aluminum. Aluminum extracted in one normal potassium chloride. Extractable aluminum is important for soil classification and for certain evaluations of soil nutrient availability and of toxicities. An aluminum saturation of about 60 percent generally is regarded as toxic to most plants. It may be a useful measurement for assessing potential lime needs on acid soils.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Fluviomarine terrace. A constructional coastal strip, sloping gently seaward and/or down valley, veneered or completely composed of unconsolidated sediments (typically clay, silt, sand, and fine gravel). Sediments were deposited by both marine and fluvial processes, resulting from sea level fluctuations and/or stream migration.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gibbsite. An aluminum hydroxide mineral; the principal component of many bauxites.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Halloysite. A layered silicate clay mineral, commonly hydrated, with a low nutrient-holding capacity.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very

slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interbedded. Said of beds lying between or alternating with other beds of different character; especially said of rock material or sediments laid down in sequence between other beds, such as “interbedded” sands and gravel.

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from surface and shallow subsurface sources.

Intertropical Convergence Zone. The boundary area between the trade wind systems of the Northern Hemisphere and the Southern Hemisphere. It is an elongated band of disturbed weather that generally is broken rather than continuous. In the Pacific Ocean area, it generally is north of the Equator in all seasons.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Island. a) An area of land completely surrounded by water. Compare to barrier island, coral island. b) An elevated area of land surrounded by swamp or marsh or isolated at high water or during floods.

K factor. A measurement of potential soil erodibility caused by detachment of soil particles by water.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Kandic horizon. A diagnostic subsoil horizon that has a clay increase relative to the overlying horizons and has low-activity clays, i.e., more than 16 cmol kg^{-1} clay.

Karrens. Repeating surficial solution channels, grooves, or other forms etched onto massive, bare limestone surfaces and separated by ridges; types range in width from a few millimeters to more than 1 meter; the total complex (all varieties) of surficial solution forms on compact, pure limestone. Many types can be specified.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Karst cone. A conical residual hill in an area of karst. It has a rounded top and relatively steep, convex (e.g., parabolic) side slopes and commonly occurs in tropical climates.

Karst tower. An isolated, separate hill or ridge in a karst region. It consists of an erosional remnant of limestone or other sedimentary rocks with vertical or nearly vertical, convex side slopes and commonly is surrounded by alluvial plains, lagoons, or deep, rugged ravines.

Karst valley. A closed depression formed by the coalescence of multiple sinkholes; an elongate, solutional valley. Its drainage is subsurface, its diameter ranges from several hundred meters to a few kilometers, and it generally has a scalloped margin inherited from the sinkholes. It may have nominal, local channel flow (small streams), sequential sinkhole inlets (springs), and outlets (such as a swallow hole).

Kegel karst. A general term for several types of humid tropical karst landscapes characterized by numerous closely spaced, cone-shaped (cone karst), hemispherical-shaped (halbkugelkarst), or tower-shaped (tower karst) hills with vertical or nearly vertical walls and with intervening closed depressions and narrow steep-walled karst valleys or passageways.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. Saturated hydraulic conductivity. (See Permeability.) Described in terms of inches and centimeters per hour, the Ksat classes used in this survey are as follows:

Very high	more than 36 cm/hr (more than 14.17 in/hr)
High	3.6-36 cm/hr (1.42-4.17 in/hr)
Moderately high	0.360-3.6 cm/hr (.142-1.42 in/hr)
Low	0.0036-0.036 cm/hr (0.0015-0.014 in/hr)
Very low	less than 0.0036 cm/hr (less than 0.0014 in/hr)

Lagoon. A shallow stretch of saltwater or brackish water partly or completely separated from a sea or lake by an offshore reef, barrier island, sandbank, or spit. A nearly level, filled trough or depression behind the longshore bar on a barrier beach and built by a receding pluvial or glacial lake.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Lime. In agriculture, a soil amendment containing calcium carbonate or calcium oxide; used to neutralize soil acidity and furnish calcium for plant growth. Dolomite or dolomitic lime also contains magnesium carbonate and furnishes magnesium for plant growth.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Mangrove swamp. A tropical or subtropical marine swamp formed in a silty, organic, or (occasionally) coralline substratum and characterized by abundant mangrove trees along the seashore in a low area of salty or brackish water affected by daily tidal fluctuation but protected from violent wave action by reefs or land; dominated by saturated soils, commonly Sulfaquents.

Marine deposit. Sediments (dominantly sands, silts, and clays) of marine origin; laid down in the waters of an ocean. Compare to estuarine deposit, lagoonal deposit.

Marine lake. An inland body of permanently standing brackish or saline water occupying a depression on the Earth's surface. The water level is commonly influenced by ocean tides through subterranean cavities connecting to nearby lagoons. The lake generally is of appreciable size (larger than a pond) and is too deep to permit emergent vegetation to take root completely across the expanse of water. Such water bodies can have unique biota.

Marine terrace. See Fluviomarine terrace.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Marsh. Periodically wet or continually flooded areas where the surface is not deeply submerged; covered dominantly by sedges, cattails, rushes, or other hydrophytic plants.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate,

gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

New Zealand phosphorus (P) retention. A measure of the amount of phosphorus sorbed by the soil, expressed as a percent.

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic-carbon content. The content of soil carbon determined by subtracting the amount of carbon contributed by carbonates from total carbon data.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Oxic horizon. A mineral soil horizon that is at least 30 centimeters thick and is characterized by the virtual absence of weatherable primary minerals or 2:1 layer silicate clays; the presence of 1:1 layer silicate clays and highly insoluble minerals, such as quartz sand; the presence of hydrated oxides of iron and aluminum; the absence of water-dispersible clay; a low cation-exchange capacity; and small amounts of exchangeable bases.

Paleosol. A soil that formed in a particular area with distinctive morphological features resulting from a soil-forming environment that no longer exists in the area. The pedogenic process was either altered as a result of external environmental changes or interrupted by burial. A paleosol (or component horizon) is classified as relict if it has persisted without major alteration of morphology by the prevailing pedogenic environment. An exhumed paleosol is one that was buried and has been re-exposed by erosion of the mantle. Most paleosols have been affected by some subsequent modification of the morphology of diagnostic horizons and truncation of the profile.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Phenocryst. Large and commonly well formed crystals set in a finer matrix or ground mass.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Reef. A ridgelike or moundlike structure, layered or massive, built by sedentary calcareous organisms, especially corals, and consisting mostly of their remains; it is wave resistant and stands above the surrounding contemporaneously deposited sediment. Reefs can also include a mass or ridge of rocks, especially coral and in places sand, gravel, or shells, rising above the surrounding estuary, sea, or lake bottom to or nearly to the surface.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saddle. A low point on a ridge or interfluve, generally a divide (pass, col) between the heads of streams flowing in opposite directions.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salt marsh. A flat, poorly drained area that is subject to periodic or occasional overflow by saltwater, has water that is brackish to strongly saline, and generally is covered by a thick mat of grassy halophytic plants; e.g., a coastal marsh periodically flooded by the sea.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Soft, friable, weathered bedrock that retains the fabric and structure of the parent rock and exhibits extensive intercrystal and intracrystal weathering. In pedology, the term "saprolite" has been used to refer to any unconsolidated residual material that underlies the soil and grades to hard bedrock below.

Saturated hydraulic conductivity (Ksat). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Smearing hazard. The tendency for wet soils with a high content of clay to have the permeability rate lowered through the sealing of soil pores. Smearing can occur when pressure is applied by digging implements, such as backhoe buckets or shovels. Sealing of pores affects soil uses that require maintaining permeability, such as septic tank absorption fields.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil erodibility factors. The Kw and Kf factors quantify the susceptibility of soil to detachment by water. These erodibility factors predict the long-term average soil loss that results from sheet and rill erosion when various cropping systems and conservation techniques are used. The whole soil is considered in the Kw factor, but only the fine-earth fraction, which is the material less than 2 millimeters in diameter, is considered in the Kf factor.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Solution platform. A broad, nearly horizontal intertidal surface (modern or relict) formed across carbonate rocks, produced primarily through solution with contributions by intertidal weathering and biological erosion and deposition, not by abrasion.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded

tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsidence. The decrease in surface elevation as a result of the drainage of wet soils that have organic layers or semifluid mineral layers.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Swale. A shallow, open depression in unconsolidated material. It lacks a defined channel but can funnel overland or subsurface flow into a drainageway.

Swamp. An area of low, saturated ground, intermittently or permanently covered with water and vegetated dominantly by shrubs and trees, with or without the accumulation of peat.

T factor. The soil loss tolerance, which is defined as the average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. Maintaining the quality of the soil includes maintaining the surface soil as a seedbed for plants, maintaining the atmosphere-soil interface in a manner that allows the entry of air and water into the soil and protects the underlying soil from wind and water erosion, and maintaining the total soil volume as a reservoir for water and plant nutrients, which is preserved by minimizing soil loss.

Talf. A broad, flat plain dominated by closed depressions and having a nonintegrated or poorly integrated drainage system.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The abbreviations for texture terms (or in-lieu-of texture terms) are explained in table 13.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley floor. A general term for the nearly level to gently sloping, lowest surface of a valley. Landforms include axial stream channels, the flood plain, flood-plain steps, and, in some areas, low terrace surfaces. Compare to flood-plain landforms, meander, braided channel, valley side.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Volcanic breccia. A volcaniclastic rock made up mostly of angular rock fragments more than 2 millimeters in size. It does not form in the same way as pyroclastic breccia.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water table. The upper surface of ground water or the level below which the soil is saturated by water. Also, the top of an aquifer.

Wave-cut platform. A gently sloping surface produced by wave erosion, extending into the sea or lake from the base of a wave-cut cliff. This feature includes both the wave-cut bench and the abrasion platform. Compare to submerged wave-cut platform.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Koror, Palau)

Month	Temperature				Precipitation			
						2 years in 10 will have--		
	Average daily maximum	Average daily minimum	Average daily	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more
	^{o}F	^{o}F	^{o}F	Units	In	In	In	
January-----	87.6	75.1	81.3	972	11.19	6.01	15.78	15
February----	87.5	74.9	81.2	882	9.65	3.89	15.10	12
March-------	88.3	75.2	81.7	983	8.79	4.32	13.24	12
April-------	88.8	75.7	82.2	967	9.45	4.45	13.65	11
May---------	89.1	76.0	82.6	1,009	11.27	8.30	14.13	16
June--------	88.1	75.4	81.7	952	17.54	12.53	22.43	19
July--------	87.5	75.3	81.4	974	16.99	11.74	21.90	17
August------	87.5	75.7	81.6	980	14.47	9.64	18.97	16
September---	88.0	76.0	82.0	959	11.65	6.89	16.59	13
October-----	88.2	75.8	82.0	992	13.41	9.37	17.51	17
November----	89.0	75.9	82.5	974	11.62	8.04	15.04	16
December----	88.3	75.6	82.0	991	12.33	7.95	16.86	16
Yearly:								
Average---	88.2	75.5	81.9	---	---	---	---	---
Extreme---	95	69	---	---	---	---	---	---
Total-----	---	---	---	11,636	148.35	131.81	165.11	180

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
600	Aimeliik silt loam, 2 to 6 percent slopes	325	0.3
601	Aimeliik silt loam, 6 to 12 percent slopes	1,526	1.4
602	Aimeliik silt loam, 12 to 30 percent slopes	9,394	8.7
603	Aimeliik silt loam, 30 to 50 percent slopes	19,888	18.4
604	Aimeliik silt loam, 50 to 75 percent slopes	12,846	11.9
605	Aimeliik silt loam, bedded tuff substratum, 2 to 6 percent slopes	18	*
606	Aimeliik silt loam, bedded tuff substratum, 6 to 12 percent slopes	530	0.5
607	Aimeliik silt loam, bedded tuff substratum, 12 to 30 percent slopes	1,900	1.8
608	Aimeliik silt loam, bedded tuff substratum, 30 to 50 percent slopes	2,777	2.6
609	Aimeliik silt loam, bedded tuff substratum, 50 to 75 percent slopes	1,154	1.1
610	Aimeliik-Ollei complex, 20 to 55 percent slopes	450	0.4
611	Aimeliik-Ollei complex, 40 to 75 percent slopes	1,286	1.2
612	Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 2 to 6 percent slopes	251	0.2
613	Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 6 to 12 percent slopes	1,563	1.4
614	Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes	3,578	3.3
615	Chia-Insak complex, 0 to 1 percent slopes	1,582	1.5
616	Dechel silty clay, 0 to 2 percent slopes	1,007	0.9
617	Ilachetomel-Naniak complex, 0 to 1 slopes	10,385	9.6
618	Mesei-Dechel complex, 0 to 2 percent slopes	3,432	3.2
619	Nekken-Ollei complex, 12 to 30 percent slopes	344	0.3
620	Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 20 to 50 percent slopes	2,944	2.7
621	Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 50 to 75 percent slopes	594	0.5
622	Oxic Dystrudepts, 2 to 6 percent slopes	355	0.3
623	Oxic Dystrudepts, 12 to 50 percent slopes	193	0.2
624	Ngatpang silty clay loam, 2 to 6 percent slopes	341	0.3
625	Ngatpang silty clay loam, 6 to 12 percent slopes	419	0.4
626	Ngatpang silty clay loam, 12 to 30 percent slopes	522	0.5
627	Ngatpang silty clay loam, well drained, 30 to 50 percent slopes	235	0.2
628	Ngedebus highly organic fine sandy loam, 0 to 3 percent slopes	3,380	3.1
629	Majuro extremely cobbly fine sandy loam, 2 to 6 percent slopes	458	0.4
630	Ngersuul silt loam, 0 to 4 percent slopes	1,575	1.5
631	Odesangel peat, 0 to 1 percent slopes	973	0.9
632	Ollei-Nekken complex, 30 to 50 percent slopes	485	0.4
633	Ollei-Nekken complex, 50 to 75 percent slopes	1,019	0.9
634	Ollei-Rock outcrop complex, 12 to 75 percent slopes	538	0.5
635	Palau silt loam, 2 to 6 percent slopes	320	0.3
636	Palau silty clay loam, 6 to 12 percent slopes	896	0.8
637	Palau silt loam, 12 to 30 percent slopes	1,267	1.2
638	Palau silt loam, 30 to 50 percent slopes	727	0.7
639	Palau silt loam, 50 to 75 percent slopes	248	0.2
640	Palau silty clay loam, bedded tuff substratum, 2 to 6 percent slopes	57	*
641	Palau silty clay loam, bedded tuff substratum, 6 to 12 percent slopes	296	0.3
642	Palau silt loam, bedded tuff substratum, 12 to 30 percent slopes	610	0.6
643	Palau silty clay loam, bedded tuff substratum, 30 to 50 percent slopes	377	0.3
644	Palau silty clay loam, bedded tuff substratum, 50 to 75 percent slopes	51	*
645	Peleliu extremely cobbly clay loam, 0 to 4 percent slopes	2,770	2.6
646	Peleliu-Chelbacheb complex, 6 to 20 percent slopes	594	0.5
647	Peleliu-Chelbacheb-Rock outcrop complex, 80 to 150 percent slopes	12,766	11.8
648	Tabecheding silty clay loam, 2 to 6 percent slopes	628	0.6
649	Tabecheding silty clay loam, 6 to 12 percent slopes	349	0.3
650	Aquic Dystrudepts, 2 to 12 percent slopes	555	0.5
651	Tabecheding silty clay loam, 12 to 30 percent slopes	575	0.5
652	Aquic Dystrudepts, 12 to 30 percent slopes	169	0.2
653	Typic Udorthents complex, mined, 0 to 75 percent slopes	118	0.1
654	Orthents-Urban land complex, 0 to 50 percent slopes	1,039	1.0
655	Quarry	63	*
656	Water, brackish	657	0.6

See footnote at end of table.

Table 2.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
657	Water, fresh	21	*
659	Nekken-Ollei complex, lower fertility, 12 to 30 percent slopes	207	0.2
660	Ollei-Rock outcrop complex, lower fertility, 30 to 50 percent slopes	313	0.3
661	Ollei-Nekken complex, lower fertility, 50 to 75 percent slopes	182	0.2

* Less than 0.1 percent.

Table 3.--Forest Management

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
600:							
Aimeliik-----------	85	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.14	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (not limiting)	0.14	Low strength	0.50
601:							
Aimeliik-----------	85	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Low strength	1.00
				Slope/erodibility	0.50	Landslides	1.00
				Aluminum saturation (not limiting)	0.11	Slope	0.50
602:							
Aimeliik-----------	85	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Low strength	1.00
				Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (not limiting)	0.11	Slope	1.00
603:							
Aimeliik-----------	85	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting	0.11	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (not limiting)	0.11	Low strength	0.50
604:							
Aimeliik-----------	85	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.83	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (very limiting)	0.83	Low strength	0.50
605:							
Aimeliik, bedded tuff substratum----	85	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Low strength	1.00
				Aluminum saturation (not limiting)	0.11	Landslides	1.00
606:							
Aimeliik, bedded tuff substratum----	90	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.83	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (very limiting)	0.83	Slope	0.50
				Slope/erodibility	0.50	Low strength	0.50

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
607:							
Aimeliik, bedded tuff substratum	90	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Low strength	1.00
				Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (not limiting)	0.11	Slope	1.00
608:							
Aimeliik, bedded tuff substratum	90	Moderate		Very severe		Poorly suited	
		Aluminum saturation not limiting)	0.11	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Low strength	1.00
				Aluminum saturation (not limiting)	0.11	Landslides	1.00
609:							
Aimeliik, bedded tuff substratum	90	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Low strength	1.00
				Aluminum saturation (not limiting)	0.11	Landslides	1.00
610:							
Aimeliik	45	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Low strength	1.00
				Aluminum saturation (not limiting)	0.11	Landslides	1.00
Ollei	30	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.03	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95		
				Aluminum saturation (not limiting)	0.03		
611:							
Aimeliik	40	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.11	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Low strength	1.00
				Aluminum saturation (not limiting)	0.11	Landslides	1.00
Ollei	35	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.03	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95		
				Aluminum saturation (not limiting)	0.03		

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
612:							
Babelthuap	55	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (somewhat limiting)	0.57	Low strength	0.50
						Rock fragments	0.50
		Aluminum saturation (somewhat limiting)	0.57				
Ngardmau	25	High		Very severe		Poorly suited	
		Aluminum saturation (limiting)	0.79	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (limiting)	0.79	Low strength	0.50
						Rock fragments	0.50
		Exchangeable bases (limiting)	0.75				
Typic Udorthents	15	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (very limiting)	0.91	Low strength	0.50
						Rock fragments	0.50
		Exchangeable bases (limiting)	0.75				
613:							
Babelthuap	55	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (somewhat limiting)	0.57	Slope	0.50
						Low strength	0.50
		Aluminum saturation (somewhat limiting)	0.57			Rock fragments	0.50
				Slope/erodibility	0.50		
Ngardmau	25	High		Very severe		Poorly suited	
		Aluminum saturation (limiting)	0.79	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (limiting)	0.79	Slope	0.50
						Low strength	0.50
		Exchangeable bases (limiting)	0.75			Rock fragments	0.50
				Slope/erodibility	0.50		
Typic Udorthents	15	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Landslides	1.00
				Aluminum saturation (very limiting)	0.91	Slope	0.50
						Low strength	0.50
		Exchangeable bases (limiting)	0.75			Rock fragments	0.50
				Slope/erodibility	0.50		
614:							
Babelthuap	45	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
		Aluminum saturation (somewhat limiting)	0.57	Slope/erodibility	0.95	Slope	1.00
				Aluminum saturation (somewhat limiting)	0.57	Low strength	0.50
						Rock fragments	0.50

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
614:							
Ngardmau	30	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95	Slope	1.00
				Aluminum saturation (limiting)	0.79	Low strength	0.50
		Aluminum saturation (limiting)	0.79			Rock fragments	0.50
Typic Udorthents	20	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95	Slope	1.00
				Aluminum saturation (very limiting)	0.91	Low strength	0.50
		Exchangeable bases (limiting)	0.75			Rock fragments	0.50
615:							
Chia	65	High		Very severe		Poorly suited	
		Wetness	1.00	High content of organic matter	1.00	Flooding	1.00
						Low strength	1.00
				Flash flooding >= occasional	1.00	Wetness	1.00
						Landslides	0.10
				Subsidence	1.00		
				AASHTO GI of <5	1.00		
				Soil slippage	0.10		
Insak	30	High		Very severe		Poorly suited	
		Wetness	1.00	Flash flooding >= occasional	1.00	Flooding	1.00
		Carbonate content	1.00			Wetness	1.00
		Salinity	1.00	AASHTO GI of <5	1.00	Landslides	0.10
		Exchangeable bases (very limiting)	1.00	Soil slippage	0.10		
		Soil reaction	0.50				
616:							
Dechel	85	High		Very severe		Poorly suited	
		Wetness	1.00	Flash flooding >= occasional	1.00	Ponding	1.00
		Aluminum saturation (somewhat limiting)	0.42			Flooding	1.00
				Ponding (any duration)	1.00	Wetness	1.00
						Low strength	0.50
				Aluminum saturation (somewhat limiting)	0.42	Landslides	0.10
				Soil slippage	0.10		
617:							
Ilachetomel	75	High		Very severe		Poorly suited	
		Wetness	1.00	High content of organic matter	1.00	Flooding	1.00
		Aluminum saturation (not limiting)	0.01			Low strength	1.00
				Flash flooding >= occasional	1.00	Wetness	1.00
						Landslides	0.10
				Subsidence	1.00		
				AASHTO GI of <5	1.00		
				Soil slippage	0.10		

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
617:							
Naniak	20	High		Very severe		Poorly suited	
		Wetness	1.00	Flash flooding >= occasional	1.00	Ponding	1.00
		Salinity	1.00			Flooding	1.00
		Soil reaction	0.50	Ponding (any duration)	1.00	Low strength	1.00
		Aluminum saturation (not limiting)	0.14			Wetness	1.00
				AASHTO GI 5 to 8	0.33	Landslides	0.10
				Aluminum saturation (not limiting)	0.14		
				Soil slippage	0.10		
618:							
Mesei	55	High		Very severe		Poorly suited	
		Wetness	1.00	High content of organic matter	1.00	Ponding	1.00
						Flooding	1.00
				Flash flooding >= occasional	1.00	Low strength	1.00
						Wetness	1.00
				Ponding (any duration)	1.00	Landslides	0.10
				Subsidence	1.00		
				Soil slippage	0.10		
Dechel	30	High		Very severe		Poorly suited	
		Wetness	1.00	Flash flooding >= occasional	1.00	Ponding	1.00
		Aluminum saturation (somewhat limiting)	0.42			Flooding	1.00
				Ponding (any duration)	1.00	Wetness	1.00
						Low strength	0.50
				Aluminum saturation (somewhat limiting)	0.42	Landslides	0.10
				Soil slippage	0.10		
619:							
Nekken	60	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.05	Soil slippage	1.00	Landslides	1.00
				AASHTO GI 5 to 8	0.67	Slope	1.00
				Slope/erodibility	0.50	Low strength	0.50
				Aluminum saturation (not limiting)	0.05		
Ollei	30	Moderate		Very severe		Poorly suited	
		Aluminum saturation (somewhat limiting)	0.27	Soil slippage	1.00	Landslides	1.00
				AASHTO GI of <5	1.00	Slope	1.00
				Slope/erodibility	0.95		
				Aluminum saturation (somewhat limiting)	0.27		
620:							
Ngardmau	50	High		Very severe		Poorly suited	
		Aluminum	0.91	Soil slippage	1.00	Slope	1.00
		saturation (very limiting)	0.75	Slope/erodibility		Landslides	1.00
				Aluminum		Low strength	0.50
		Exchangeable bases (limiting)		saturation (very	0.95	Rock fragments	0.50
				limiting)	0.91		

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
620:							
Babelthuap----------	30	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Slope	1.00
		Aluminum saturation (limiting)	0.71	Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (limiting)	0.71	Low strength	0.50
						Rock fragments	0.50
Typic Udorthents----	15	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Slope	1.00
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (very limiting)	0.91	Low strength	0.50
						Rock fragments	0.50
621:							
Ngardmau------------	50	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Slope	1.00
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (very limiting)	0.91	Low strength	0.50
						Rock fragments	0.50
Babelthuap----------	30	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Slope	1.00
		Aluminum saturation (somewhat limiting)	0.57	Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (somewhat limiting)	0.57	Low strength	0.50
						Rock fragments	0.50
Typic Udorthents----	15	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Slope	1.00
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (very limiting)	0.91	Low strength	0.50
						Rock fragments	0.50
622:							
Oxic Dystrudepts----	90	High		Very severe		Poorly suited	
		Wetness	1.00	Soil slippage	1.00	Landslides	1.00
		Exchangeable bases (very limiting)	1.00	Aluminum saturation (limiting)	0.63	Wetness	0.50
		Aluminum saturation (limiting)	0.63				
		Soil reaction	0.50				
623:							
Oxic Dystrudepts----	90	High		Very severe		Poorly suited	
		Wetness	1.00	Soil slippage	1.00	Landslides	1.00
		Exchangeable bases (very limiting)	1.00	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (limiting)	0.63	Aluminum saturation (limiting)	0.63	Low strength	0.50
		Soil reaction	0.50			Wetness	0.50

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
624:							
Ngatpang	80	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
		Aluminum saturation (limiting)	0.63	Aluminum saturation (limiting)	0.63	Low strength	0.50
		Soil reaction	0.50			Wetness	0.50
625:							
Ngatpang	80	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
		Aluminum saturation (limiting)	0.63	Aluminum saturation (limiting)	0.63	Slope	0.50
		Soil reaction	0.50	Slope/erodibility	0.50	Wetness	0.50
626:							
Ngatpang	75	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
		Aluminum saturation (limiting)	0.63	Slope/erodibility	0.95	Slope	1.00
		Soil reaction	0.50	AASHTO GI 5 to 8	0.67	Low strength	0.50
				Aluminum saturation (limiting)	0.63	Wetness	0.50
627:							
Ngatpang	80	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Slope	1.00
		Aluminum saturation (limiting)	0.63	Slope/erodibility	0.95	Landslides	1.00
		Soil reaction	0.50	Aluminum saturation (limiting)	0.63	Low strength	0.50
						Wetness	0.50
628:							
Ngedebus	75	High		Very severe		Poorly suited	
		Carbonate content	1.00	Flash flooding >= occasional	1.00	Flooding	1.00
				AASHTO GI of <5	1.00	Landslides	0.10
				Soil slippage	0.10		
629:							
Majuro	85	High		Very severe		Poorly suited	
		Carbonate content	1.00	Flash flooding >= occasional	1.00	Flooding	1.00
				AASHTO GI of <5	1.00	Rock fragments	0.50
				Soil slippage	0.10	Sandiness	0.50
						Landslides	0.10
630:							
Ngersuul	80	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.14	Flash flooding >= occasional	1.00	Flooding	1.00
				Aluminum saturation (not limiting)	0.14	Low strength	0.50
				Soil slippage	0.10	Landslides	0.10

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
631:							
Odesangel	80	High		Very severe		Poorly suited	
		Wetness	1.00	High content of organic matter	1.00	Ponding	1.00
		Soil reaction	1.00	Flash flooding >= occasional	1.00	Flooding	1.00
				Ponding (any duration)	1.00	Low strength	1.00
				Subsidence	1.00	Wetness	1.00
				AASHTO GI of <5	1.00	Landslides	0.10
632:							
Ollei	50	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.03	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95		
				Aluminum saturation (not limiting)	0.03		
Nekken	30	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.05	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Landslides	1.00
				AASHTO GI 5 to 8	0.67	Low strength	0.50
				Aluminum saturation (not limiting)	0.05		
633:							
Ollei	55	Moderate		Very severe		Poorly suited	
		Aluminum saturation (somewhat limiting)	0.27	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95		
				Aluminum saturation (somewhat limiting)	0.27		
Nekken	25	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.05	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95	Low strength	0.50
				Aluminum saturation (not limiting)	0.05		
634:							
Ollei	50	Moderate		Very severe		Poorly suited	
		Aluminum saturation (not limiting)	0.03	AASHTO GI of <5	1.00	Landslides	1.00
				Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Low strength	0.50
				Aluminum saturation (not limiting)	0.03		
Rock outcrop	30	Not rated		Not rated		Not rated	

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
635:							
Palau	85	High		Severe		Moderately suited	
		Exchangeable bases (limiting)	0.75	Aluminum saturation (somewhat limiting)	0.58	Low strength	0.50
		Aluminum saturation (somewhat limiting)	0.58	Soil slippage	0.50	Landslides	0.50
636:							
Palau	85	High		Severe		Moderately suited	
		Exchangeable bases (limiting)	0.75	Aluminum saturation (somewhat limiting)	0.58	Slope	0.50
		Aluminum saturation (somewhat limiting)	0.58	Slope/erodibility	0.50	Low strength	0.50
		Soil reaction	0.50	Soil slippage	0.50	Landslides	0.50
637:							
Palau	85	High		Severe		Poorly suited	
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (somewhat limiting)	0.58	Aluminum saturation (somewhat limiting)	0.58	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50
638:							
Palau	85	High		Severe		Poorly suited	
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (limiting)	0.70	Aluminum saturation (limiting)	0.70	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50
639:							
Palau	85	High		Severe		Poorly suited	
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (somewhat limiting)	0.58	Aluminum saturation (somewhat limiting)	0.58	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50
640:							
Palau, bedded tuff substratum	75	High		Severe		Moderately suited	
		Exchangeable bases (limiting)	0.75	Aluminum saturation (somewhat limiting)	0.58	Low strength	0.50
		Aluminum saturation (somewhat limiting)	0.58	Soil slippage	0.50	Landslides	0.50
641:							
Palau, bedded tuff substratum	75	High		Severe		Moderately suited	
		Exchangeable bases (limiting)	0.75	Aluminum saturation (somewhat limiting)	0.58	Slope	0.50
		Aluminum saturation (somewhat limiting)	0.58	Slope/erodibility	0.50	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
642:							
Palau, bedded tuff substratum	75	High		Severe		Poorly suited	
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (limiting)	0.70	Aluminum saturation (limiting)	0.70	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50
643:							
Palau, bedded tuff substratum	75	High		Severe		Poorly suited	
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (somewhat limiting)	0.58	Aluminum saturation (somewhat limiting)	0.58	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50
644:							
Palau, bedded tuff substratum	75	High		Severe		Poorly suited	
		Exchangeable bases (limiting)	0.75	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (limiting)	0.70	Aluminum saturation (limiting)	0.70	Low strength	0.50
				Soil slippage	0.50	Landslides	0.50
645:							
Peleliu	70	High		Very severe		Moderately suited	
		Carbonate content	1.00	AASHTO GI of <5	1.00	Rock fragments	0.50
				Soil slippage	0.10	Landslides	0.10
646:							
Peleliu	60	Moderate		Very severe		Poorly suited	
		Carbonate content	0.50	AASHTO GI of <5	1.00	Slope	1.00
				Slope/erodibility	0.50	Rock fragments	0.50
				Soil slippage	0.10	Sandiness	0.50
						Landslides	0.10
Chelbacheb	25	High		Very severe		Poorly suited	
		Carbonate content	1.00	High content of organic matter	1.00	Low strength	1.00
						Slope	1.00
				AASHTO GI of <5	1.00	Rock fragments	0.50
				Slope/erodibility	0.50	Landslides	0.10
				Soil slippage	0.10		
647:							
Peleliu	40	High		Very severe		Poorly suited	
		Carbonate content	1.00	AASHTO GI of <5	1.00	Slope	1.00
				Slope/erodibility	0.95	Rock fragments	1.00
				Soil slippage	0.10	Landslides	0.10
Chelbacheb	30	High		Very severe		Poorly suited	
		Carbonate content	1.00	High content of organic matter	1.00	Slope	1.00
						Low strength	1.00
				AASHTO GI of <5	1.00	Rock fragments	0.50
				Slope/erodibility	0.95	Landslides	0.10
				Soil slippage	0.10		
Rock outcrop	25	Not rated		Not rated		Not rated	

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
648:							
Tabecheding---------	85	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Ponding (any duration)	1.00	Ponding	1.00
		Wetness	1.00	Aluminum saturation (very limiting)	0.86	Low strength	0.50
		Aluminum saturation (very limiting)	0.86	Soil slippage	0.50	Landslides	0.50
		Soil reaction	0.50			Wetness	0.50
649:							
Tabecheding---------	80	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Ponding (any duration)	1.00	Ponding	1.00
		Wetness	1.00	Aluminum saturation (very limiting)	0.86	Slope	0.50
		Aluminum saturation (very limiting)	0.86	Slope/erodibility	0.50	Low strength	0.50
		Soil reaction	0.50	Soil slippage	0.50	Landslides	0.50
						Wetness	0.50
650:							
Aquic Dystrudepts---	90	High		Very severe		Poorly suited	
		Wetness	1.00	Ponding (any duration)	1.00	Ponding	1.00
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
		Aluminum saturation (very limiting)	0.86	Aluminum saturation (very limiting)	0.86	Wetness	0.50
		Soil reaction	0.50	Slope/erodibility	0.50	Slope	0.50
651:							
Tabecheding---------	80	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Ponding (any duration)	1.00	Ponding	1.00
		Wetness	1.00	Slope/erodibility	0.95	Slope	1.00
		Aluminum saturation (very limiting)	0.86	Aluminum saturation (very limiting)	0.86	Low strength	0.50
		Soil reaction	0.50	Soil slippage	0.50	Landslides	0.50
						Wetness	0.50
652:							
Aquic Dystrudepts---	75	High		Very severe		Poorly suited	
		Wetness	1.00	Ponding (any duration)	1.00	Ponding	1.00
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Landslides	1.00
		Aluminum saturation (very limiting)	0.86	Slope/erodibility	0.95	Slope	1.00
		Soil reaction	0.50	Aluminum saturation (very limiting)	0.86	Wetness	0.50

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
653:							
Typic Udorthents, 30 to 75 percent slopes	45	High		Very severe		Poorly suited	
		Exchangeable bases (very limiting)	1.00	Soil slippage	1.00	Slope	1.00
		Aluminum saturation (very limiting)	0.88	Slope/erodibility	0.95	Landslides	1.00
				Aluminum saturation (very limiting)	0.88	Low strength	0.50
						Rock fragments	0.50
Typic Udorthents, 0 to 6 percent slopes	40	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.91	Soil slippage	1.00	Landslides	1.00
		Exchangeable bases (limiting)	0.75	Aluminum saturation (very limiting)	0.91	Low strength	0.50
						Rock fragments	0.50
654:							
Typic Udorthents	45	High		Very severe		Poorly suited	
		Aluminum saturation (very limiting)	0.88	Soil slippage	1.00	Landslides	1.00
		Exchangeable bases (limiting)	0.75	Aluminum saturation (very limiting)	0.88	Slope	0.50
				Slope/erodibility	0.50	Low strength	0.50
						Rock fragments	0.50
Urban land	40	Not rated		Not rated		Not rated	
655:							
Quarry	100	Not rated		Not rated		Not rated	
656:							
Water, brackish	100	Not rated		Not rated		Not rated	
657:							
Water, fresh	100	Not rated		Not rated		Not rated	
659:							
Nekken, lower fertility	60	Moderate		Very severe		Poorly suited	
		Exchangeable bases (somewhat limiting)	0.50	AASHTO GI of <5	1.00	Landslides	1.00
		Aluminum saturation (not limiting)	0.06	Soil slippage	1.00	Slope	1.00
				Slope/erodibility	0.95	Low strength	0.50
				Aluminum saturation (not limiting)	0.06		
Ollei, lower fertility	30	Moderate		Very severe		Poorly suited	
		Aluminum saturation (somewhat limiting)	0.42	Soil slippage	1.00	Low strength	1.00
				AASHTO GI of <5	1.00	Landslides	1.00
				Slope/erodibility	0.95	Slope	1.00
				Aluminum saturation (somewhat limiting)	0.42		

Table 3.--Forest Management--Continued

Map symbol and soil name	Pct. of map unit	Potential for seedling mortality: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
660:							
Ollei, lower fertility	50	Moderate		Very severe		Poorly suited	
		Aluminum saturation (somewhat limiting)	0.19	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95	Low strength	0.50
				Aluminum saturation (somewhat limiting)	0.19		
Rock outcrop	30	Not rated		Not rated		Not rated	
661:							
Ollei, lower fertility	60	Moderate		Very severe		Poorly suited	
		Aluminum saturation (somewhat limiting)	0.42	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95		
				Aluminum saturation (somewhat limiting)	0.42		
Nekken, lower fertility	25	Moderate		Very severe		Poorly suited	
		Exchangeable bases (somewhat limiting)	0.50	AASHTO GI of <5	1.00	Slope	1.00
				Soil slippage	1.00	Landslides	1.00
				Slope/erodibility	0.95	Low strength	0.50
		Aluminum saturation (not limiting)	0.06	Aluminum saturation (not limiting)	0.06		

Table 4.--Camp Areas, Picnic Areas, and Playgrounds

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
600:							
Aimeliik------------	85	Not limited		Not limited		Somewhat limited	
						Slopes 2 to 6%	0.50
601:							
Aimeliik------------	85	Somewhat limited		Somewhat limited		Very limited	
		Slopes 8 to 15%	0.04	Slopes 8 to 15%	0.04	Slopes >6%	1.00
602:							
Aimeliik------------	85	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
603:							
Aimeliik------------	85	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
604:							
Aimeliik------------	85	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
605:							
Aimeliik, bedded tuff substratum----	85	Not limited		Not limited		Somewhat limited	0.50
						Slopes 2 to 6%	0.50
606:							
Aimeliik, bedded tuff substratum----	90	Somewhat limited		Somewhat limited		Very limited	
		Slopes 8 to 15%	0.04	Slopes 8 to 15%	0.04	Slopes >6%	1.00
607:							
Aimeliik, bedded tuff substratum---	90	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
608:							
Aimeliik, bedded tuff substratum----	90	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
609:							
Aimeliik, bedded tuff substratum----	90	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
610:							
Aimeliik------------	45	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3” 25 to 75%	0.77	Fragments >3” 25 to 75%	0.77	Fragments >3” >30%	1.00
Ollei---------------	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3” >75%	1.00	Fragments >3” >75%	1.00	Bedrock depth <20”	1.00
		Bedrock depth 10-20”	0.80	Bedrock depth 10-20”	0.80	Fragments >3” >30%	1.00
611:							
Aimeliik------------	40	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
611:							
Ollei	40	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3″ 25 to 75%	0.77	Fragments >3″ 25 to 75%	0.77	Bedrock depth <20″	1.00
		Bedrock depth 10-20″	0.46	Bedrock depth 10-20″	0.46	Fragments >3″ >30%	1.00
612:							
Babelthuap	55	Very limited		Very limited		Very limited	
		Fragments (<3″) >50%	1.00	Fragments (<3″) >50%	1.00	Surface fragments (<3″) >25%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6″/hr	0.26	Slopes 2 to 6%	0.50
				Surface pH from 3.5 to 5	0.01	Permeability of .06-.6″/hr	0.26
Ngardmau	25	Somewhat limited		Somewhat limited		Very limited	
		Fragments (<3″) 25-50%	0.92	Fragments (<3″) 25-50%	0.92	Surface fragments (<3″) >25%	1.00
				Permeability of .06-.6″/hr	0.26	Slopes 2 to 6%	0.26
						Permeability of .06-.6″/hr	0.26
Typic Udorthents	15	Somewhat limited		Somewhat limited		Very limited	
		Fragments (<3″) 25-50%	0.92	Fragments (<3″) 25-50%	0.92	Surface fragments (<3″) >25%	1.00
				Permeability of .06-.6″/hr	0.26	Slopes 2 to 6%	0.50
						Permeability of .06-.6″/hr	0.26
613:							
Babelthuap	55	Very limited		Very limited		Very limited	
		Fragments (<3″) >50%	1.00	Fragments (<3″) >50%	1.00	Surface fragments (<3″) >25%	1.00
		Slopes 8 to 15%	0.04	Permeability of .06-.6″/hr	0.26	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Slopes 8 to 15%	0.04	Permeability of .06-.6″/hr	0.26
Ngardmau	25	Somewhat limited		Somewhat limited		Very limited	
		Slopes 8 to 15%	0.04	Permeability of .06-.6″/hr	0.26	Slopes >6%	1.00
				Slopes 8 to 15%	0.04	Surface fragments (<3″) 10-25%	0.77
						Permeability of .06-.6″/hr	0.26
Typic Udorthents	15	Somewhat limited		Somewhat limited		Very limited	
		Fragments (<3″) 25-50%	0.92	Fragments (<3″) 25-50%	0.92	Surface fragments (<3″) >25%	1.00
		Slopes 8 to 15%	0.04	Permeability of .06-.6″/hr	0.26	Slopes >6%	1.00
				Slopes 8 to 15%	0.04	Permeability of .06-.6″/hr	0.26
614:							
Babelthuap	45	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3″) 25-50%	0.99	Fragments (<3″) 25-50%	0.99	Surface fragments (<3″) >25%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6″/hr	0.26	Permeability of .06-.6″/hr	0.26

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
614:							
Ngardmau	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3”) 25-50%	0.92	Fragments (<3”) 25-50%	0.92	Surface fragments (<3”) >25%	1.00
				Permeability of .06-.6”/hr	0.26	Permeability of .06-.6”/hr	0.26
Typic Udorthents	20	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3”) 25-50%	0.92	Fragments (<3”) 25-50%	0.92	Surface fragments (<3”) >25%	1.00
				Permeability of .06-.6”/hr	0.26	Permeability of .06-.6”/hr	0.26
615:							
Chia	65	Very limited		Very limited		Very limited	
		Saturation <18” depth	1.00	Saturation <12” depth	1.00	Saturation <18” depth	1.00
		Flash flooding	1.00	Very frequent flash flooding	1.00	Flash flooding > occasional	1.00
		Organic matter content	1.00	Unified OL or PT	1.00	Surface EC >8 mmhos/cm	1.00
Insak	30	Very limited		Very limited		Very limited	
		Saturation <18” depth	1.00	Saturation <12” depth	1.00	Saturation <18” depth	1.00
		Surface EC >8 mmhos/cm	1.00	Surface EC >8 mmhos/cm	1.00	Surface EC >8 mmhos/cm	1.00
		Flash flooding	1.00	Very frequent flash flooding	1.00	Flash flooding > occasional	1.00
616:							
Dechel	85	Very limited		Very limited		Very limited	
		Saturation <18” depth	1.00	Saturation <12” depth	1.00	Saturation <18” depth	1.00
		Flash flooding	1.00	Ponding (any duration)	1.00	Flash flooding > occasional	1.00
		Ponding (any duration)	1.00	Surface clay >= 40%	1.00	Ponding (any duration)	1.00
617:							
Ilachetomel	75	Very limited		Very limited		Very limited	
		Saturation <18” depth	1.00	Saturation <12” depth	1.00	Saturation <18” depth	1.00
		Flash flooding	1.00	Very frequent flash flooding	1.00	Flash flooding > occasional	1.00
		Organic matter content	1.00	Unified OL or PT	1.00	Surface EC >8 mmhos/cm	1.00
Naniak	20	Very limited		Very limited		Very limited	
		Saturation <18” depth	1.00	Saturation <12” depth	1.00	Saturation <18” depth	1.00
		Surface EC >8 mmhos/cm	1.00	Surface EC >8 mmhos/cm	1.00	Surface EC >8 mmhos/cm	1.00
		Flash flooding	1.00	Very frequent flash flooding	1.00	Flash flooding > occasional	1.00

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
618:							
Mesei	55	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Saturation <12" depth	1.00	Saturation <18" depth	1.00
		Flash flooding	1.00	Unified OL or PT	1.00	Flash flooding > occasional	1.00
		Ponding (any duration)	1.00	Ponding (any duration)	1.00	Ponding (any duration)	1.00
Dechel	30	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Saturation <12" depth	1.00	Saturation <18" depth	1.00
		Flash flooding	1.00	Ponding (any duration)	1.00	Flash flooding > occasional	1.00
		Ponding (any duration)	1.00	Frequent flash flooding	0.50	Ponding (any duration)	1.00
619:							
Nekken	60	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
						Bedrock 20-40" and slopes >2%	0.50
Ollei	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Bedrock depth <10"	1.00	Bedrock depth <10"	1.00	Bedrock depth <20"	1.00
		Fragments >3" 25 to 75%	0.77	Fragments >3" 25 to 75%	0.77	Fragments >3" >30%	1.00
620:							
Ngardmau	50	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
				Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
Babelthuap	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Surface pH from 3.5 to 5	0.14	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
Typic Udorthents	15	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3") 25-50%	0.92	Fragments (<3") 25-50%	0.92	Surface fragments (<3") >25%	1.00
				Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
621:							
Ngardmau	50	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3") 25-50%	0.88	Fragments (<3") 25-50%	0.88	Surface fragments (<3") >25%	1.00
				Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
621:							
Babelthuap----------	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
Typic Udorthents----	15	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3") 25-50%	0.92	Fragments (<3") 25-50%	0.92	Surface fragments (<3") >25%	1.00
				Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
622:							
Oxic Dystrudepts----	90	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Permeability <.06"/hr	1.00	Saturation <18" depth	1.00
				Saturation from 12 to 30" depth	0.86	Permeability <.06"/hr	1.00
						Slopes 2 to 6%	0.50
623:							
Oxic Dystrudepts----	90	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Permeability <.06"/hr	1.00	Slopes >6%	1.00
		Slopes >15%	1.00	Slopes >15%	1.00	Saturation <18" depth	1.00
				Saturation from 12 to 30" depth	0.86	Permeability <.06"/hr	1.00
624:							
Ngatpang------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Saturation from 18 to 30" depth	0.95	Saturation from 12 to 30" depth	0.68	Saturation from 18 to 30" depth	0.95
				Permeability of .06-.6"/hr	0.21	Slopes 2 to 6%	0.50
						Permeability of .06-.6"/hr	0.21
625:							
Ngatpang------------	80	Somewhat limited		Very limited		Very limited	
		Saturation from 18 to 30" depth	0.95	Permeability <.06"/hr	1.00	Permeability <.06"/hr	1.00
		Slopes 8 to 15%	0.04	Saturation from 12 to 30" depth	0.68	Slopes >6%	1.00
				Slopes 8 to 15%	0.04	Saturation from 18 to 30" depth	0.95
626:							
Ngatpang------------	75	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Saturation from 18 to 30" depth	0.95	Saturation from 12 to 30" depth	0.68	Saturation from 18 to 30" depth	0.95
				Permeability of .06-.6"/hr	0.21	Permeability of .06-.6"/hr	0.21
627:							
Ngatpang------------	80	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Saturation from 18 to 30" depth	0.95	Permeability <.06"/hr	1.00	Permeability <.06"/hr	1.00
				Saturation from 12 to 30" depth	0.68	Saturation from 18 to 30" depth	0.95

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
628:							
Ngedebus	75	Very limited		Very limited		Very limited	
		Flash flooding	1.00	Surface sand fractions >90% by wt.	1.00	Surface sand fractions >90% by wt.	1.00
		Surface sand fractions >90% by wt.	1.00			Occasional flash flooding	0.50
						Slopes 2 to 6%	0.02
629:							
Majuro	85	Very limited		Very limited		Very limited	
		Flash flooding	1.00	Surface sand fractions >90% by wt.	1.00	Surface sand fractions >90% by wt.	1.00
		Surface sand fractions >90% by wt.	1.00	Fragments >3” >75%	1.00	Fragments >3” >30%	1.00
		Fragments >3” >75%	1.00			Slopes 2 to 6%	0.50
630:							
Ngersuul	80	Very limited		Somewhat limited		Very limited	
		Flash flooding	1.00	Frequent flash flooding	0.50	Flash flooding > occasional	1.00
				Permeability of .06-.6”/hr	0.21	Permeability of .06-.6”/hr	0.21
						Slopes 2 to 6%	0.02
631:							
Odesangel	80	Very limited		Very limited		Very limited	
		Saturation <18” depth	1.00	Saturation <12” depth	1.00	Saturation <18” depth	1.00
		Flash flooding	1.00	Unified OL or PT	1.00	Flash flooding > occasional	1.00
		Surface sand fractions >90% by wt.	1.00	Ponding (any duration)	1.00	Ponding (any duration)	1.00
632:							
Ollei	50	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3” 25 to 75%	0.77	Fragments >3” 25 to 75%	0.77	Bedrock depth <20”	1.00
		Bedrock depth 10-20”	0.26	Bedrock depth 10-20”	0.26	Surface fragments (<3”) >25%	1.00
Nekken	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3” >75%	1.00	Fragments >3” >75%	1.00	Fragments >3” >30%	1.00
						Bedrock 20-40” and slopes >2%	0.50
633:							
Ollei	55	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Bedrock depth 10-20”	0.84	Bedrock depth 10-20”	0.84	Bedrock depth <20”	1.00
		Fragments >3” 25 to 75%	0.77	Fragments >3” 25 to 75%	0.77	Surface fragments (<3”) >25%	1.00
Nekken	25	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
						Bedrock 20-40” and slopes >2%	0.50

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
634:							
Ollei	50	Very limited		Very limited		Very limited	
		Fragments >3" >75%	1.00	Fragments >3" >75%	1.00	Slopes >6%	1.00
		Slopes >15%	1.00	Slopes >15%	1.00	Bedrock depth <20"	1.00
		Bedrock depth <10"	1.00	Bedrock depth <10"	1.00	Fragments >3" >30%	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
635:							
Palau	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Slopes 2 to 6%	0.50
				Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26
						Surface pH from 3.5 to 5	0.01
636:							
Palau	85	Somewhat limited		Somewhat limited		Very limited	
		Slopes 8 to 15%	0.04	Permeability of .06-.6"/hr	0.26	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Slopes 8 to 15%	0.04	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
637:							
Palau	85	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
638:							
Palau	85	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
639:							
Palau	85	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
640:							
Palau, bedded tuff substratum	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Slopes 2 to 6%	0.50
				Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26
						Surface pH from 3.5 to 5	0.01

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
641:							
Palau, bedded tuff substratum	75	Somewhat limited		Somewhat limited		Very limited	
		Slopes 8 to 15%	0.04	Permeability of .06-.6"/hr	0.26	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Slopes 8 to 15%	0.04	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
642:							
Palau, bedded tuff substratum	75	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
643:							
Palau, bedded tuff substratum	75	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
644:							
Palau, bedded tuff substratum	75	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Surface pH from 3.5 to 5	0.01	Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
				Surface pH from 3.5 to 5	0.01	Surface pH from 3.5 to 5	0.01
645:							
Peleliu	70	Very limited		Very limited		Very limited	
		Fragments >10" >3%	1.00	Fragments >10" >3%	1.00	Fragments >3" >30%	1.00
		Bedrock depth 10-20"	0.92	Bedrock depth 10-20"	0.92	Surface fragments (<3") >25%	1.00
		Fragments >3" 25 to 75%	0.80	Fragments >3" 25 to 75%	0.80	Fragments >10" >3%	1.00
646:							
Peleliu	60	Very limited		Very limited		Very limited	
		Fragments >10" >3%	1.00	Fragments >10" >3%	1.00	Fragments >10" >3%	1.00
		Fragments >3" >75%	1.00	Fragments >3" >75%	1.00	Bedrock depth <20"	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Fragments >3" >30%	1.00
Chelbacheb	25	Very limited		Very limited		Very limited	
		Bedrock depth <10"	1.00	Bedrock depth <10"	1.00	Bedrock depth <20"	1.00
		Fragments >10" >3%	1.00	Fragments >10" >3%	1.00	Fragments >3" >30%	1.00
		Slopes 8 to 15%	0.84	Slopes 8 to 15%	0.84	Slopes >6%	1.00

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
647:							
Peleliu	40	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3" >75%	1.00	Fragments >3" >75%	1.00	Bedrock depth <20"	1.00
		Fragments >10" >3%	1.00	Fragments >10" >3%	1.00	Fragments >3" >30%	1.00
Chelbacheb	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Bedrock depth <10"	1.00	Bedrock depth <10"	1.00	Bedrock depth <20"	1.00
		Fragments >10" >3%	1.00	Fragments >10" >3%	1.00	Fragments >3" >30%	1.00
Rock outcrop	25	Not rated		Not rated		Not rated	
648:							
Tabecheding	85	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Ponding (any duration)	1.00	Saturation <18" depth	1.00
		Ponding (any duration)	1.00	Permeability <.06"/hr	1.00	Ponding (any duration)	1.00
		Surface pH from 3.5 to 5	0.44	Saturation from 12 to 30" depth	0.90	Permeability <.06"/hr	1.00
649:							
Tabecheding	80	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Ponding (any duration)	1.00	Saturation <18" depth	1.00
		Ponding (any duration)	1.00	Permeability <.06"/hr	1.00	Ponding (any duration)	1.00
		Surface pH from 3.5 to 5	0.44	Saturation from 12 to 30" depth	0.90	Permeability <.06"/hr	1.00
650:							
Aquic Dystrudepts	90	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Saturation <12" depth	1.00	Saturation <18" depth	1.00
		Ponding (any duration)	1.00	Ponding (any duration)	1.00	Surface fragments (<3") >25%	1.00
		Fragments (<3") 25-50%	0.97	Permeability <.06"/hr	1.00	Ponding (any duration)	1.00
651:							
Tabecheding	80	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Ponding (any duration)	1.00	Slopes >6%	1.00
		Ponding (any duration)	1.00	Permeability <.06"/hr	1.00	Saturation <18" depth	1.00
		Slopes >15%	1.00	Slopes >15%	1.00	Ponding (any duration)	1.00
652:							
Aquic Dystrudepts	75	Very limited		Very limited		Very limited	
		Saturation <18" depth	1.00	Saturation <12" depth	1.00	Slopes >6%	1.00
		Ponding (any duration)	1.00	Ponding (any duration)	1.00	Saturation <18" depth	1.00
		Slopes >15%	1.00	Permeability <.06"/hr	1.00	Ponding (any duration)	1.00

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
653:							
Typic Udorthents, 30 t0 75 percent slopes-----------	45	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
				Permeability of .06-.6"/hr	0.26	Permeability of .06-.6"/hr	0.26
Typic Udorthents, 0 to 6 percent slopes-----------	40	Very limited		Very limited		Very limited	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
				Permeability of .06-.6"/hr	0.26	Slopes 2 to 6%	0.50
						Permeability of .06-.6"/hr	0.26
654:							
Typic Udorthents----	45	Very limited		Very limited		Very limited	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Slopes 8 to 15%	0.16	Permeability of .06-.6"/hr	0.26	Slopes >6%	1.00
				Slopes 8 to 15%	0.16	Permeability of .06-.6"/hr	0.26
Urban land----------	40	Not rated		Not rated		Not rated	
655:							
Quarry--------------	100	Not rated		Not rated		Not rated	
656:							
Water, brackish-----	100	Not rated		Not rated		Not rated	
657:							
Water, fresh--------	100	Not rated		Not rated		Not rated	
659:							
Nekken, lower fertility----------	60	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments >3" 25 to 75%	0.74	Fragments >3" 25 to 75%	0.74	Fragments >3" >30%	1.00
						Bedrock 20-40" and slopes >2%	0.50
Ollei, lower fertility----------	30	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Bedrock depth <10"	1.00	Bedrock depth <10"	1.00	Bedrock depth <20"	1.00
						Fragments >3" 5 to 30%	0.26

Table 4.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
660:							
Ollei, lower fertility---------	50	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Bedrock depth 10-20″	0.16	Bedrock depth 10-20″	0.16	Bedrock depth <20″	1.00
						Fragments >3″ 5 to 30%	0.03
Rock outcrop--------	30	Not rated		Not rated		Not rated	
661:							
Ollei, lower fertility----------	60	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
		Fragments (<3″) >50%	1.00	Fragments (<3″) >50%	1.00	Surface fragments (<3″) >25%	1.00
		Bedrock depth 10-20″	0.84	Bedrock depth 10-20″	0.84	Bedrock depth <20″	1.00
Nekken, lower fertility----------	25	Very limited		Very limited		Very limited	
		Slopes >15%	1.00	Slopes >15%	1.00	Slopes >6%	1.00
						Bedrock 20-40″ and slopes >2%	0.50
						Surface fragments (<3″) 10-25%	0.14

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
600:					
Aimeliik	85	Somewhat limited		Not limited	
		Aluminum saturation (not limiting)	0.14		
601:					
Aimeliik	85	Somewhat limited		Very limited	
		Aluminum saturation (not limiting)	0.11	K factor >.35 and slopes >8%	1.00
		Slopes 8 to 15%	0.04		
602:					
Aimeliik	85	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (not limiting)	0.11	Slopes 15 to 25%	0.68
603:					
Aimeliik	85	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Aluminum saturation (not limiting)	0.11	K factor >.35 and slopes >8%	1.00
604:					
Aimeliik	85	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Aluminum saturation (very limiting)	0.83	K factor >.35 and slopes >8%	1.00
605:					
Aimeliik, bedded tuff substratum	85	Somewhat limited		Not limited	
		Aluminum saturation (not limiting)	0.11		
606:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Aluminum saturation (very limiting)	0.83	K factor >.35 and slopes >8%	1.00
		Slopes 8 to 15%	0.04		
607:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (not limiting)	0.11	Slopes 15 to 25%	0.68
608:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Aluminum saturation (not limiting)	0.11	K factor >.35 and slopes >8%	1.00
609:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Aluminum saturation (not limiting)	0.11	K factor >.35 and slopes >8%	1.00

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
610:					
Aimeliik	45	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Fragments >3" >30%	1.00	Slopes >25%	1.00
		Aluminum saturation (not limiting)	0.11	Fragments >3" 25 to 75%	0.77
Ollei	30	Very limited		Very limited	
		Bedrock depth <20"	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Fragments >3" >30%	1.00	Fragments >3" >75%	1.00
611:					
Aimeliik	40	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Aluminum saturation (not limiting)	0.11	K factor >.35 and slopes >8%	1.00
Ollei	35	Very limited		Very limited	
		Bedrock depth <20"	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Fragments >3" >30%	1.00	Fragments >3" 25 to 75%	0.77
612:					
Babelthuap	55	Very limited		Not limited	
		Exchangeable bases (very limiting)	1.00		
		Fragments (gravel-size) >50%	1.00		
		Aluminum saturation (somewhat limiting)	0.57		
Ngardmau	25	Very limited		Not limited	
		Fragments (gravel size) 25 to 50%	0.92		
		Aluminum saturation (limiting)	0.79		
		Exchangeable bases (limiting)	0.75		
Typic Udorthents	15	Very limited		Not limited	
		Fragments (gravel size) 25 to 50%	0.92		
		Aluminum saturation (very limiting)	0.91		
		Exchangeable bases (limiting)	0.75		
613:					
Babelthuap	55	Very limited		Very limited	
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Fragments (gravel-size) >50%	1.00		
		Aluminum saturation (somewhat limiting)	0.57		

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
613:					
Ngardmau	25	Somewhat limited		Very limited	
		Aluminum saturation (limiting)	0.79	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (limiting)	0.75		
		Slopes 8 to 15%	0.04		
Typic Udorthents	15	Very limited		Very limited	
		Fragments (gravel size) 25 to 50%	0.92	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (very limiting)	0.91		
		Exchangeable bases (limiting)	0.75		
614:					
Babelthuap	45	Very limited		Very limited	
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Slopes >15%	1.00	Slopes 15 to 25%	0.68
		Fragments (gravel size) 25 to 50%	0.99		
Ngardmau	30	Very limited		Very limited	
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Slopes >15%	1.00	Slopes 15 to 25%	0.68
		Fragments (gravel size) 25 to 50%	0.92		
Typic Udorthents	20	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Fragments (gravel size) 25 to 50%	0.92	Slopes 15 to 25%	0.68
		Aluminum saturation (very limiting)	0.91		
615:					
Chia	65	Very limited		Very limited	
		Flash flooding > occasional	1.00	Saturation <12" depth	1.00
		Excess sulfur	1.00	Very frequent flash flooding	1.00
		Calcium carbonate > 40%	1.00	Surface sand fractions 70 to 90% by wt.	0.68
Insak	30	Very limited		Very limited	
		Flash flooding > occasional	1.00	Saturation <12" depth	1.00
		Calcium carbonate > 40%	1.00	Very frequent flash flooding	1.00
		Surface EC >8 mmhos/cm	1.00	Surface sand fractions 70 to 90% by wt.	0.68
616:					
Dechel	85	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12" depth	1.00
		Flash flooding > occasional	1.00	Ponding (any duration)	1.00
		Saturation <12" depth	1.00	Surface clay >= 40%	1.00

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
617:					
Ilachetomel	75	Very limited		Very limited	
		Flash flooding >	1.00	Saturation <12” depth	1.00
		occasional		Very frequent flash	1.00
		Excess sulfur	1.00	flooding	
		Saturation <12” depth		Surface sand fractions	0.68
			1.00	70 to 90% by wt.	
Naniak	20	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12” depth	1.00
		Flash flooding >	1.00	Very frequent flash	1.00
		occasional		flooding	
		Excess sulfur	1.00	Ponding (any duration)	1.00
618:					
Mesei	55	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12” depth	1.00
		Flash flooding >	1.00	Saprists with high	1.00
		occasional		organic matter content	
		Saturation <12” depth	1.00	Ponding (any duration)	1.00
Dechel	30	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12” depth	1.00
		Flash flooding >	1.00	Ponding (any duration)	1.00
		occasional		Frequent flash flooding	0.50
		Saturation <12” depth	1.00		
619:					
Nekken	60	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and	1.00
		Bedrock depth 20 to 40”		slopes >8%	
		Aluminum saturation		Slopes 15 to 25%	0.68
		(not limiting)	0.05		
Ollei	30	Very limited		Very limited	
		Bedrock depth <20”	1.00	K factor >.35 and	1.00
		AWC <2” to 40”		slopes >8%	
		Slopes >15%	1.00	Fragments >3” 25 to 75%	0.77
			1.00	Slopes 15 to 25%	0.68
620:					
Ngardmau	50	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and	1.00
		Aluminum saturation	0.91	slopes >8%	
		(very limiting)		Slopes >25%	1.00
		Exchangeable bases			
		(limiting)	0.75		
Babelthuap	30	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and	1.00
		Exchangeable bases		slopes >8%	
		(very limiting)	1.00	Slopes >25%	1.00
		Fragments (gravel-size)			
		>50%	1.00		
Typic Udorthents	15	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and	1.00
		Fragments (gravel size)		slopes >8%	
		25 to 50%	0.92	Slopes >25%	1.00
		Aluminum saturation			
		(very limiting)	0.91		

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
621:					
Ngardmau	50	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Aluminum saturation (very limiting)	0.91	K factor >.35 and slopes >8%	1.00
		Fragments (gravel size) 25 to 50%	0.88		
Babelthuap	30	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Fragments (gravel-size) >50%	1.00		
Typic Udorthents	15	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Fragments (gravel size) 25 to 50%	0.92	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (very limiting)	0.91		
622:					
Oxic Dystrudepts	90	Very limited		Somewhat limited	
		Exchangeable bases (very limiting)	1.00	Saturation from 12 to 24” depth	0.68
		Saturation from 12 to 24” depth	0.68		
		Aluminum saturation (limiting)	0.63		
623:					
Oxic Dystrudepts	90	Very limited		Very limited	
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Slopes >15%	1.00	Slopes >25%	1.00
		Saturation from 12 to 24” depth	0.68	Saturation from 12 to 24” depth	0.68
624:					
Ngatpang	80	Very limited		Somewhat limited	
		Exchangeable bases (very limiting)	1.00	Saturation from 12 to 24” depth	0.32
		Aluminum saturation (limiting)	0.63		
		Saturation from 12 to 24” depth	0.32		
625:					
Ngatpang	80	Very limited		Very limited	
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (limiting)	0.63	Saturation from 12 to 24” depth	0.32
		Saturation from 12 to 24” depth	0.32		

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
626:					
Ngatpang	75	Very limited		Very limited	
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Slopes >15%	1.00	Slopes 15 to 25%	0.68
		Aluminum saturation (limiting)	0.63	Saturation from 12 to 24” depth	0.32
627:					
Ngatpang	80	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (limiting)	0.63	Saturation from 12 to 24” depth	0.32
628:					
Ngedebus	75	Very limited		Very limited	
		Calcium carbonate > 40%	1.00	Surface sand fractions >90% by wt.	1.00
		AWC 2-4” to 40”	0.88		
		Occasional flash flooding	0.50		
629:					
Majuro	85	Very limited		Very limited	
		Calcium carbonate > 40%	1.00	Surface sand fractions >90% by wt.	1.00
		Fragments >3” >30%	1.00		
		AWC 2-4” to 40”	0.83	Fragments >3” >75%	1.00
630:					
Ngersuul	80	Very limited		Somewhat limited	
		Flash flooding > occasional	1.00	Frequent flash flooding	0.50
		Aluminum saturation (not limiting)	0.14		
631:					
Odesangel	80	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12” depth	1.00
		Flash flooding > occasional	1.00	Ponding (any duration)	1.00
				Surface sand fractions >90% by wt.	1.00
		Calcium carbonate > 40%	1.00		
632:					
Ollei	50	Very limited		Very limited	
		Bedrock depth <20”	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		AWC <2” to 40”	1.00		
				Fragments >3” 25 to 75%	0.77
Nekken	30	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Fragments >3” >30%	1.00	K factor >.35 and slopes >8%	1.00
		Bedrock depth 20 to 40”	0.90		
				Fragments >3” >75%	1.00
633:					
Ollei	55	Very limited		Very limited	
		Bedrock depth <20”	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		AWC <2” to 40”	1.00		
				Fragments >3” 25 to 75%	0.77

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
633:					
Nekken	25	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Bedrock depth 20 to 40"	0.88	K factor >.35 and slopes >8%	1.00
		AWC 2-4" to 40"	0.05		
634:					
Ollei	50	Very limited		Very limited	
		Bedrock depth <20"	1.00	K factor >.35 and slopes >8%	1.00
		Fragments >3" >30%	1.00	Fragments >3" >75%	1.00
		AWC <2" to 40"	1.00	Slopes >25%	1.00
Rock outcrop	30	Not rated		Not rated	
635:					
Palau	85	Very limited		Not limited	
		AWC 2-4" to 40"	0.93		
		Exchangeable bases (limiting)	0.75		
		Aluminum saturation (somewhat limiting)	0.58		
636:					
Palau	85	Very limited		Very limited	
		AWC 2-4" to 40"	0.85	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (limiting)	0.75		
		Aluminum saturation (somewhat limiting)	0.58		
637:					
Palau	85	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		AWC 2-4" to 40"	0.98	Slopes 15 to 25%	0.68
		Exchangeable bases (limiting)	0.75		
638:					
Palau	85	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		AWC <2" to 40"	1.00	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (limiting)	0.75		
639:					
Palau	85	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		AWC 2-4" to 40"	0.93	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (limiting)	0.75		
640:					
Palau, bedded tuff substratum	75	Somewhat limited		Not limited	
		Exchangeable bases (limiting)	0.75		
		AWC 2-4" to 40"	0.74		
		Aluminum saturation (somewhat limiting)	0.58		

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways: Limitation	Value	Paths and trails: Limitation	Value
641:					
Palau, bedded tuff substratum-----	75	Somewhat limited		Very limited	
		Exchangeable bases (limiting)	0.75	K factor >.35 and slopes >8%	1.00
		AWC 2-4” to 40”	0.66		
		Aluminum saturation (somewhat limiting)	0.58		
642:					
Palau, bedded tuff substratum-----	75	Very limited		Very limited	
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		AWC 2-4” to 40”	0.96		
		Exchangeable bases (limiting)	0.75	Slopes 15 to 25%	0.68
643:					
Palau, bedded tuff substratum-----	75	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Exchangeable bases (limiting)	0.75	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (somewhat limiting)	0.58		
644:					
Palau, bedded tuff substratum-----	75	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		AWC 2-4” to 40”	0.94	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (limiting)	0.75		
645:					
Peleliu---------------------------	70	Very limited		Very limited	
		Bedrock depth <20”	1.00	Fragments >10” >3%	1.00
		Calcium carbonate > 40%	1.00	Fragments >3” 25 to 75%	0.80
		Fragments >3” >30%	1.00		
646:					
Peleliu---------------------------	60	Very limited		Very limited	
		Bedrock depth <20”	1.00	Fragments >10” >3%	1.00
		Calcium carbonate > 40%	1.00	Fragments >3” >75%	1.00
		Fragments >3” >30%	1.00	K factor >.35 and slopes >8%	1.00
Chelbacheb------------------------	25	Very limited		Very limited	
		Bedrock depth <20”	1.00	Fragments >10” >3%	1.00
		Calcium carbonate > 40%	1.00	Fragments >3” 25 to 75%	0.80
		Fragments >3” >30%	1.00	Folist with high organic matter content	0.50
647:					
Peleliu---------------------------	40	Very limited		Very limited	
		Bedrock depth <20”	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		Calcium carbonate > 40%	1.00		
				Fragments >3” >75%	1.00
Chelbacheb------------------------	30	Very limited		Very limited	
		Bedrock depth <20”	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	Fragments >10” >3%	1.00
		Calcium carbonate > 40%	1.00	Fragments >3” 25 to 75%	0.80
Rock outcrop----------------------	25	Not rated		Not rated	

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways		Paths and trails	
		Limitation	Value	Limitation	Value
648:					
Tabecheding	85	Very limited		Very limited	
		Ponding (any duration)	1.00	Ponding (any duration)	1.00
		Exchangeable bases (very limiting)	1.00	Saturation from 12 to 24” depth	0.78
		Aluminum saturation (very limiting)	0.86		
649:					
Tabecheding	80	Very limited		Very limited	
		Ponding (any duration)	1.00	Ponding (any duration)	1.00
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (very limiting)	0.86	Saturation from 12 to 24” depth	0.78
650:					
Aquic Dystrudepts	90	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12” depth	1.00
		Saturation <12” depth	1.00	Ponding (any duration)	1.00
		Exchangeable bases (very limiting)	1.00	K factor >.35 and slopes >8%	1.00
651:					
Tabecheding	80	Very limited		Very limited	
		Ponding (any duration)	1.00	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (very limiting)	1.00	Ponding (any duration)	1.00
		Slopes >15%	1.00	Saturation from 12 to 24” depth	0.78
652:					
Aquic Dystrudepts	75	Very limited		Very limited	
		Ponding (any duration)	1.00	Saturation <12” depth	1.00
		Saturation <12” depth	1.00	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (very limiting)	1.00	Ponding (any duration)	1.00
653:					
Typic Udorthents, 30 to 75 Percent slopes	45	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Fragments (gravel-size) >50%	1.00	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (very limiting)	1.00		
Typic Udorthents, 0 to 6 percent Slopes	40	Very limited		Not limited	
		Fragments (gravel-size) >50%	1.00		
		Aluminum saturation (very limiting)	0.91		
		Exchangeable bases (limiting)	0.75		

Table 5.--Lawns, Landscaping, and Golf Fairways and Paths and Trails--Continued

Map symbol and soil name	Pct. of map unit	Lawns, landscaping, and golf fairways: Limitation	Value	Paths and trails: Limitation	Value
654:					
Typic Udorthents	45	Very limited		Very limited	
		Fragments (gravel-size) >50%	1.00	K factor >.35 and slopes >8%	1.00
		Aluminum saturation (very limiting)	0.88		
		Exchangeable bases (limiting)	0.75		
Urban land	40	Not rated		Not rated	
655:					
Quarry	100	Not rated		Not rated	
656:					
Water, brackish	100	Not rated		Not rated	
657:					
Water, fresh	100	Not rated		Not rated	
659:					
Nekken, lower fertility	60	Very limited		Very limited	
		Fragments >3” >30%	1.00	K factor >.35 and slopes >8%	1.00
		Slopes >15%	1.00	Fragments >3” 25 to 75%	0.74
		Bedrock depth 20 to 40”	0.88	Slopes 15 to 25%	0.68
Ollei, lower fertility	30	Very limited		Very limited	
		Bedrock depth <20”	1.00	K factor >.35 and slopes >8%	1.00
		AWC <2” to 40”	1.00		
		Slopes >15%	1.00	Slopes 15 to 25%	0.68
660:					
Ollei, lower fertility	50	Very limited		Very limited	
		Bedrock depth <20”	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		AWC <2” to 40”	1.00		
Rock outcrop	30	Not rated		Not rated	
661:					
Ollei, lower fertility	60	Very limited		Very limited	
		Bedrock depth <20”	1.00	Slopes >25%	1.00
		Slopes >15%	1.00	K factor >.35 and slopes >8%	1.00
		AWC <2” to 40”	1.00		
Nekken, lower fertility	25	Very limited		Very limited	
		Slopes >15%	1.00	Slopes >25%	1.00
		Bedrock depth 20 to 40”	0.88	K factor >.35 and slopes >8%	1.00
		Exchangeable bases (somewhat limiting)	0.50		

Table 6.--Dwellings and Small Commercial Buildings

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Small commercial buildings	
		Limitation	Value	Limitation	Value
600:					
Aimeliik	85	Not limited		Very limited	
				Shrink-swell (LEP >6)	1.000
				Slopes from 4 to 8%	0.024
601:					
Aimeliik	85	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
602:					
Aimeliik	85	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
603:					
Aimeliik	85	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
604:					
Aimeliik	85	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
605:					
Aimeliik, bedded tuff substratum	85	Not limited		Very limited	
				Shrink-swell (LEP >6)	1.000
				Slopes from 4 to 8%	0.024
606:					
Aimeliik, bedded tuff substratum	90	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
607:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
608:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
609:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
610:					
Aimeliik	45	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
Ollei	30	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
		Fragments (>3”) 25 to 50%	0.019	Fragments (>3”) 25 to 50%	0.019

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Small commercial buildings	
		Limitation	Value	Limitation	Value
611:					
Aimeliik	40	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
Ollei	35	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20" depth	1.000	Bedrock (hard) <20" depth	1.000
		Fragments (>3") >50%	1.000	Fragments (>3") >50%	1.000
612:					
Babelthuap	55	Not limited		Somewhat Limited	
				Shrink-swell (LEP 3-6)	0.889
				Slopes from 4 to 8%	0.024
Ngardmau	25	Not limited		Somewhat Limited	
				Shrink-swell (LEP 3-6)	0.889
Typic Udorthents	15	Not limited		Somewhat Limited	
				Shrink-swell (LEP 3-6)	0.889
				Slopes from 4 to 8%	0.024
613:					
Babelthuap	55	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.000
Ngardmau	25	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Typic Udorthents	15	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
614:					
Babelthuap	45	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.000
Ngardmau	30	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Typic Udorthents	20	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
615:					
Chia	65	Very limited		Very limited	
		Flash flooding > rare	1.000	Subsidence	1.000
		Saturation <18" depth	1.000	Flash flooding > rare	1.000
		OL, OH, PT in 10-40"	1.000	Saturation <18" depth	1.000
Insak	30	Very limited		Very limited	
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
		Saturation <18" depth	1.000	Saturation <18" depth	1.000
		Bedrock (hard) from 20 to 40"	0.535	Bedrock (hard) from 20 to 40"	0.535

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Limitation	Value	Small commercial buildings: Limitation	Value
616:					
Dechel	85	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
		Saturation <18” depth	1.000	Saturation <18” depth	1.000
617:					
Ilachetomel	75	Very limited		Very limited	
		Flash flooding > rare	1.000	Subsidence	1.000
		Saturation <18” depth	1.000	Flash flooding > rare	1.000
		OL, OH, PT in 10-40”	1.000	Saturation <18” depth	1.000
Naniak	20	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
		Saturation <18” depth	1.000	Saturation <18” depth	1.000
618:					
Mesei	55	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Flash flooding > rare	1.000	Subsidence	1.000
		Saturation <18” depth	1.000	Flash flooding > rare	1.000
Dechel	30	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
		Saturation <18” depth	1.000	Saturation <18” depth	1.000
619:					
Nekken	60	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) from 20 to 40”	0.970	Bedrock (hard) from 20 to 40”	0.970
		Fragments (>3”) 25 to 50%	0.006	Shrink-swell (LEP 3-6)	0.321
Ollei	30	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Slopes >8%	1.000
		Slopes >15%	1.000	Bedrock (hard) <20” depth	1.000
		OL, OH, PT in 10-40”	1.000	Fragments (>3”) 25 to 50%	0.967
620:					
Ngardmau	50	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Babelthuap	30	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Typic Udorthents	15	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
621:					
Ngardmau	50	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Limitation	Value	Small commercial buildings: Limitation	Value
621:					
Babelthuap	30	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Typic Udorthents	15	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
622:					
Oxic Dystrudepts	90	Very limited		Very limited	
		Saturation <18” depth	1.000	Saturation <18” depth	1.000
				Shrink-swell (LEP >6)	1.000
				Slopes from 4 to 8%	0.024
623:					
Oxic Dystrudepts	90	Very limited		Very limited	
		Saturation <18” depth	1.000	Slopes >8%	1.000
		Slopes >15%	1.000	Saturation <18” depth	1.000
				Shrink-swell (LEP >6)	1.000
624:					
Ngatpang	80	Somewhat limited		Very limited	
		Saturation from 18 to 30” depth	0.951	Shrink-swell (LEP >6)	1.000
				Saturation from 18 to 30” depth	0.951
				Slopes from 4 to 8%	0.024
625:					
Ngatpang	80	Somewhat limited		Very limited	
		Saturation from 18 to 30” depth	0.951	Slopes >8%	1.000
		Slopes 8 to 15%	0.153	Shrink-swell (LEP >6)	1.000
				Saturation from 18 to 30” depth	0.951
626:					
Ngatpang	75	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Saturation from 18 to 30” depth	0.951	Shrink-swell (LEP >6)	1.000
				Saturation from 18 to 30” depth	0.951
627:					
Ngatpang	80	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Saturation from 18 to 30” depth	0.951	Shrink-swell (LEP >6)	1.000
				Saturation from 18 to 30” depth	0.951
628:					
Ngedebus	75	Very limited		Very limited	
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
629:					
Majuro	85	Very limited		Very limited	
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
		Fragments (>3”) 25 to 50%	0.862	Fragments (>3”) 25 to 50%	0.862
				Slopes from 4 to 8%	0.024

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Limitation	Value	Small commercial buildings: Limitation	Value
630:					
Ngersuul	80	Very limited		Very limited	
		Flash flooding > rare	1.000	Flash flooding > rare	1.000
631:					
Odesangel	80	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Flash flooding > rare	1.000	Subsidence	1.000
		Saturation <18” depth	1.000	Flash flooding > rare	1.000
632:					
Ollei	50	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
		Fragments (>3”) 25 to 50%	0.630	Fragments (>3”) 25 to 50%	0.630
Nekken	30	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
		Bedrock (hard) from 20 to 40”	0.901	Bedrock (hard) from 20 to 40”	0.901
633:					
Ollei	55	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
Nekken	25	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) from 20 to 40”	0.883	Bedrock (hard) from 20 to 40”	0.883
		Fragments (>3”) 25 to 50%	0.451	Fragments (>3”) 25 to 50%	0.451
634:					
Ollei	50	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Slopes >8%	1.000
		Fragments (>3”) >50%	1.000	Bedrock (hard) <20” depth	1.000
		Slopes >15%	1.000	Fragments (>3”) >50%	1.000
Rock outcrop	30	Not rated		Not rated	
635:					
Palau	85	Not limited		Somewhat Limited	
				Shrink-swell (LEP 3-6)	0.889
				Slopes from 4 to 8%	0.024
636:					
Palau	85	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
637:					
Palau	85	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Small commercial buildings	
		Limitation	Value	Limitation	Value
638:					
Palau	85	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
639:					
Palau	85	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
640:					
Palau, bedded tuff substratum	75	Not limited		Somewhat Limited	
				Shrink-swell (LEP 3-6)	0.889
				Slopes from 4 to 8%	0.024
641:					
Palau, bedded tuff substratum	75	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.153	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
642:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
643:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP >6)	1.000
644:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
645:					
Peleliu	70	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
		Fragments (>3”) 25 to 50%	0.831	Fragments (>3”) 25 to 50%	0.831
646:					
Peleliu	60	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Slopes >8%	1.000
		Fragments (>3”) >50%	1.000	Bedrock (hard) <20” depth	1.000
		Slopes 8 to 15%	0.708	Fragments (>3”) >50%	1.000
Chelbacheb	25	Very limited		Very limited	
		OL, OH, PT in 10-40”	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
647:					
Peleliu	40	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Small commercial buildings	
		Limitation	Value	Limitation	Value
647:					
Chelbacheb	30	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		OL, OH, PT in 10-40"	1.000	Bedrock (hard) <20" depth	1.000
		Bedrock (hard) <20" depth	1.000	Fragments (>3") >50%	1.000
Rock outcrop	25	Not rated		Not rated	
648:					
Tabecheding	85	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Saturation <18" depth	1.000	Saturation <18" depth	1.000
		Fragments (>3") 25 to 50%	0.000	Shrink-swell (LEP >6)	1.000
649:					
Tabecheding	80	Very limited		Very limited	
		Ponding (any duration)	1.000	Slopes >8%	1.000
		Saturation <18" depth	1.000	Ponding (any duration)	1.000
		Slopes 8 to 15%	0.153	Saturation <18" depth	1.000
650:					
Aquic Dystrudepts	90	Very limited		Very limited	
		Ponding (any duration)	1.000	Slopes >8%	1.000
		Saturation <18" depth	1.000	Ponding (any duration)	1.000
		Slopes 8 to 15%	0.153	Saturation <18" depth	1.000
651:					
Tabecheding	80	Very limited		Very limited	
		Ponding (any duration)	1.000	Slopes >8%	1.000
		Saturation <18" depth	1.000	Ponding (any duration)	1.000
		Slopes >15%	1.000	Saturation <18" depth	1.000
652:					
Aquic Dystrudepts	75	Very limited		Very limited	
		Ponding (any duration)	1.000	Slopes >8%	1.000
		Saturation <18" depth	1.000	Ponding (any duration)	1.000
		Slopes >15%	1.000	Saturation <18" depth	1.000
653:					
Typic Udorthents, 30 to 75 percent slopes	45	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Typic Udorthents, 0 to 6 percent slopes	40	Not limited		Somewhat Limited	
				Shrink-swell (LEP 3-6)	0.889
				Slopes from 4 to 8%	0.024
654:					
Typic Udorthents	45	Somewhat limited		Very limited	
		Slopes 8 to 15%	0.292	Slopes >8%	1.000
				Shrink-swell (LEP 3-6)	0.889
Urban land	40	Not rated		Not rated	
655:					
Quarry	100	Not rated		Not rated	

Table 6.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Small commercial buildings	
		Limitation	Value	Limitation	Value
656:					
Water, brackish	100	Not rated		Not rated	
657:					
Water, fresh	100	Not rated		Not rated	
659:					
Nekken, lower fertility	60	Very limited		Very limited	
		Fragments (>3”) >50%	1.000	Slopes >8%	1.000
		Slopes >15%	1.000	Fragments (>3”) >50%	1.000
		Bedrock (hard) from 20 to 40”	0.883	Bedrock (hard) from 20 to 40”	0.883
Ollei, lower fertility	30	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Slopes >8%	1.000
		Slopes >15%	1.000	Bedrock (hard) <20” depth	1.000
		OL, OH, PT in 10-40”	1.000		
660:					
Ollei, lower fertility	50	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
Rock outcrop	30	Not rated		Not rated	
661:					
Ollei, lower fertility	60	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) <20” depth	1.000
Nekken, lower fertility	25	Very limited		Very limited	
		Slopes >15%	1.000	Slopes >8%	1.000
		Bedrock (hard) from 20 to 40”	0.883	Bedrock (hard) from 20 to 40”	0.883
		Fragments (>3”) 25 to 50%	0.451	Fragments (>3”) 25 to 50%	0.451

Table 7.--Local Roads and Streets and Shallow Excavations

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
600:					
Aimeliik	85	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000		
601:					
Aimeliik	85	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000	Slopes 8 to 15%	0.041
602:					
Aimeliik	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Low caving potential	0.100
		Slopes >15%	1.000		
603:					
Aimeliik	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
604:					
Aimeliik	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
605:					
Aimeliik, bedded tuff substratum	85	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000		
606:					
Aimeliik, bedded tuff substratum	90	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000	Slopes 8 to 15%	0.041
607:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000		
608:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow excavations: Limitation	Value
609:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
610:					
Aimeliik	45	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
Ollei	30	Very limited		Very limited	
		Bedrock (hard) <20" depth	1.000	Bedrock (hard) < 40" depth	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Low caving potential	0.100
611:					
Aimeliik	40	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
Ollei	35	Very limited		Very limited	
		Bedrock (hard) <20" depth	1.000	Bedrock (hard) < 40" depth	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Fragments (>3") >50%	1.000
612:					
Babelthuap	55	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP 3-6)	0.889		
Ngardmau	25	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP 3-6)	0.889		
Typic Udorthents	15	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP 3-6)	0.889		
613:					
Babelthuap	55	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Slopes 8 to 15%	0.041	Slopes 8 to 15%	0.041

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
613:					
Ngardmau	25	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Low caving potential	0.100
		Soil slippage	1.000	Slopes 8 to 15%	0.041
		Shrink-swell (LEP 3-6)	0.889		
Typic Udorthents	15	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
				Low caving potential	0.100
		Soil slippage	1.000	Slopes 8 to 15%	0.041
		Shrink-swell (LEP 3-6)	0.889		
614:					
Babelthuap	45	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Slopes >15%	1.000		
Ngardmau	30	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Slopes >15%	1.000		
Typic Udorthents	20	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Slopes >15%	1.000		
615:					
Chia	65	Very limited		Very limited	
		Saturation < 12” depth	1.000	Saturation <2.5’ depth	1.000
		Subsidence > 12”	1.000	Caving potential	1.000
		Flooding >= occasional	1.000	Unified PT, OH, or OL below 20” (low strength)	1.000
Insak	30	Very limited		Very limited	
		Saturation < 12” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Flooding >= occasional	1.000		
		Bedrock (hard) from 20 to 40”	0.535	Saturation <2.5’ depth	1.000
				Caving potential	1.000
616:					
Dechel	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
				Saturation <2.5’ depth	1.000
		Ponding (any duration)	1.000	Clay >60%	1.000
		Saturation < 12” depth	1.000		
617:					
Ilachetomel	75	Very limited		Very limited	
		Saturation < 12” depth	1.000	Saturation <2.5’ depth	1.000
		Subsidence > 12”	1.000	Unified PT, OH, or OL below 20” (low strength)	1.000
		Flooding >= occasional	1.000		
				Unified PT, OH, or OL below 20” (excess humus)	1.000

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow excavations: Limitation	Value
617:					
Naniak	20	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Saturation < 12” depth	1.000	Saturation <2.5’ depth	1.000
		Flooding >= occasional	1.000	Caving potential	1.000
618:					
Mesei	55	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Ponding (any duration)	1.000	Saturation <2.5’ depth	1.000
		Saturation < 12” depth	1.000	Unified PT, OH, or OL below 20” (low strength)	1.000
Dechel	30	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Ponding (any duration)	1.000	Saturation <2.5’ depth	1.000
		Saturation < 12” depth	1.000	Flash flooding >= ocassional	0.500
619:					
Nekken	60	Very limited		Very limited	
		Soil slippage	1.000	Bedrock (hard) < 40” depth	1.000
		Slopes >15%	1.000	Caving potential	1.000
		Bedrock (hard) from 20 to 40”	0.970	Slopes >15%	1.000
Ollei	30	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Soil slippage	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Fragments (>3”) 25 to 50%	0.967
620:					
Ngardmau	50	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
Babelthuap	30	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
Typic Udorthents	15	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
621:					
Ngardmau	50	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow excavations: Limitation	Value
621:					
Babelthuap	30	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
Typic Udorthents	15	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
622:					
Oxic Dystrudepts	90	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Saturation <2.5’ depth	1.000
		Shrink-swell (LEP >6)	1.000	Clay >60%	1.000
		Soil slippage	1.000	Low caving potential	0.100
623:					
Oxic Dystrudepts	90	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Saturation <2.5’ depth	1.000
		Shrink-swell (LEP >6)	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Clay >60%	1.000
624:					
Ngatpang	80	Very limited		Very limited	
		Shrink-swell (LEP >6)	1.000	Saturation <2.5’ depth	1.000
		Soil slippage	1.000	Clay >60%	1.000
		Saturation from 12 to 30” depth	0.679	Low caving potential	0.100
625:					
Ngatpang	80	Very limited		Very limited	
		Shrink-swell (LEP >6)	1.000	Saturation <2.5’ depth	1.000
		Soil slippage	1.000	Clay >60%	1.000
		Saturation from 12 to 30” depth	0.679	Low caving potential	0.100
626:					
Ngatpang	75	Very limited		Very limited	
		Shrink-swell (LEP >6)	1.000	Saturation <2.5’ depth	1.000
		Soil slippage	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay >60%	1.000
627:					
Ngatpang	80	Very limited		Very limited	
		Shrink-swell (LEP >6)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Saturation <2.5’ depth	1.000
		Soil slippage	1.000	Clay >60%	1.000
628:					
Ngedebus	75	Very limited		Very limited	
		Flooding >= occasional	1.000	Caving potential	1.000
		Soil slippage	0.100	Saturation from 2.5’ to 6’ depth	0.820
				Flash flooding >= ocassional	0.500

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow excavations: Limitation	Value
629:					
Majuro	85	Very limited		Very limited	
		Flooding >= occasional	1.000	Caving potential	1.000
		Fragments (>3”) 25 to 50%	0.862	Fragments (>3”) 25 to 50%	0.862
		Soil slippage	0.100	Saturation from 2.5’ to 6’ depth	0.820
630:					
Ngersuul	80	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Saturation <2.5’ depth	1.000
		Flooding >= occasional	1.000	Flash flooding >= ocassional	0.500
		Soil slippage	0.100	Low caving potential	0.100
631:					
Odesangel	80	Very limited		Very limited	
		Ponding (any duration)	1.000	Ponding (any duration)	1.000
		Saturation < 12” depth	1.000	Saturation <2.5’ depth	1.000
		Subsidence > 12”	1.000	Caving potential	1.000
632:					
Ollei	50	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Fragments (>3”) 25 to 50%	0.630
Nekken	30	Very limited		Very limited	
		Slopes >15%	1.000	Bedrock (hard) < 40” depth	1.000
		Soil slippage	1.000	Slopes >15%	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
633:					
Ollei	55	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Low caving potential	0.100
Nekken	25	Very limited		Very limited	
		Slopes >15%	1.000	Bedrock (hard) < 40” depth	1.000
		Soil slippage	1.000	Slopes >15%	1.000
		Bedrock (hard) from 20 to 40”	0.883	Fragments (>3”) 25 to 50%	0.451
634:					
Ollei	50	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Soil slippage	1.000	Fragments (>3”) >50%	1.000
		Fragments (>3”) >50%	1.000	Slopes >15%	1.000
Rock outcrop	30	Not rated		Not rated	

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow excavations: Limitation	Value
635:					
Palau	85	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Low caving potential	0.100
		Shrink-swell (LEP 3-6)	0.889		
		Soil slippage	0.500		
636:					
Palau	85	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
				Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000	Slopes 8 to 15%	0.041
		Soil slippage	0.500		
637:					
Palau	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000		
		Slopes >15%	1.000		
638:					
Palau	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Low caving potential	0.100
		Slopes >15%	1.000		
		Shrink-swell (LEP >6)	1.000		
639:					
Palau	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Low caving potential	0.100
		Slopes >15%	1.000		
		Shrink-swell (LEP 3-6)	0.889		
640:					
Palau, bedded tuff substratum	75	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
				Low caving potential	0.100
		Shrink-swell (LEP 3-6)	0.889		
		Soil slippage	0.500		
641:					
Palau, bedded tuff substratum	75	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
				Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000	Slopes 8 to 15%	0.041
		Soil slippage	0.500		
642:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000		
		Slopes >15%	1.000		
643:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
				Clay from 40 to 60%	0.245
		Slopes >15%	1.000	Low caving potential	0.100
		Shrink-swell (LEP >6)	1.000		

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
644:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Shrink-swell (LEP 3-6)	0.889	Low caving potential	0.100
645:					
Peleliu	70	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Fragments (>3”) 25 to 50%	0.831	Fragments (>3”) 25 to 50%	0.831
		Soil slippage	0.100	Low caving potential	0.100
646:					
Peleliu	60	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
		Slopes 8 to 15%	0.837	Slopes 8 to 15%	0.837
Chelbacheb	25	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
		Slopes 8 to 15%	0.837	Slopes 8 to 15%	0.837
647:					
Peleliu	40	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
Chelbacheb	30	Very limited		Very limited	
		Bedrock (hard) <20” depth	1.000	Bedrock (hard) < 40” depth	1.000
		Fragments (>3”) >50%	1.000	Fragments (>3”) >50%	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
Rock outcrop	25	Not rated		Not rated	
648:					
Tabecheding	85	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Ponding (any duration)	1.000	Saturation <2.5’ depth	1.000
		Shrink-swell (LEP >6)	1.000	Clay >60%	1.000
649:					
Tabecheding	80	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Shrink-swell (LEP >6)	1.000	Saturation <2.5’ depth	1.000
		Ponding (any duration)	1.000	Clay >60%	1.000
650:					
Aquic Dystrudepts	90	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Shrink-swell (LEP >6)	1.000	Saturation <2.5’ depth	1.000
		Ponding (any duration)	1.000	Clay >60%	1.000

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow excavations: Limitation	Value
651:					
Tabecheding	80	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Shrink-swell (LEP >6)	1.000	Saturation <2.5′ depth	1.000
		Ponding (any duration)	1.000	Slopes >15%	1.000
652:					
Aquic Dystrudepts	75	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Ponding (any duration)	1.000
		Shrink-swell (LEP >6)	1.000	Saturation <2.5′ depth	1.000
		Ponding (any duration)	1.000	Slopes >15%	1.000
653:					
Typic Udorthents, 30 to 75 percent slopes	45	Very limited		Very limited	
		AASHTO GI >8 (low soil strength)	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
Typic Udorthents, 0 to 6 percent slopes	40	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Low caving potential	0.100
		Shrink-swell (LEP 3-6)	0.889		
654:					
Typic Udorthents	45	Very limited		Somewhat limited	
		AASHTO GI >8 (low soil strength)	1.000	Clay from 40 to 60%	0.245
		Soil slippage	1.000	Slopes 8 to 15%	0.163
		Shrink-swell (LEP 3-6)	0.889	Low caving potential	0.100
Urban land	40	Not rated		Not rated	
655:					
Quarry	100	Not rated		Not rated	
656:					
Water, brackish	100	Not rated		Not rated	
657:					
Water, fresh	100	Not rated		Not rated	
659:					
Nekken, lower fertility	60	Very limited		Very limited	
		Fragments (>3″) >50%	1.000	Bedrock (hard) < 40″ depth	1.000
		Soil slippage	1.000	Fragments (>3″) >50%	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
Ollei, lower fertility	30	Very limited		Very limited	
		Bedrock (hard) <20″ depth	1.000	Bedrock (hard) < 40″ depth	1.000
		Soil slippage	1.000	Slopes >15%	1.000
		Slopes >15%	1.000	Low caving potential	0.100

Table 7.--Local Roads and Streets and Shallow Excavations--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
660:					
Ollei, lower fertility	50	Very limited		Very limited	
		Bedrock (hard) <20" depth	1.000	Bedrock (hard) < 40" depth	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Low caving potential	0.100
Rock outcrop	30	Not rated		Not rated	
661:					
Ollei, lower fertility	60	Very limited		Very limited	
		Bedrock (hard) <20" depth	1.000	Bedrock (hard) < 40" depth	1.000
		Slopes >15%	1.000	Slopes >15%	1.000
		Soil slippage	1.000	Low caving potential	0.100
Nekken, lower fertility	25	Very limited		Very limited	
		Slopes >15%	1.000	Bedrock (hard) < 40" depth	1.000
		Soil slippage	1.000	Fragments (>3") 25 to 50%	0.451
		Slopes >15%	1.000		
		Bedrock (hard) from 20 to 40"	0.883		

Table 8.--Construction Materials

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
600:					
Aimeliik	85	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.860		
601:					
Aimeliik	85	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.890		
		Slope 8 to 12%	0.959		
602:					
Aimeliik	85	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.890	Slopes 15 to 25%	0.320
603:					
Aimeliik	85	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Very low aluminum saturation	0.890	AASHTO GIN >8 (low soil strength)	0.000
604:					
Aimeliik	85	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Moderate aluminum saturation	0.170	AASHTO GIN >8 (low soil strength)	0.000
605:					
Aimeliik, bedded tuff substratum	85	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.890		
606:					
Aimeliik, bedded tuff substratum	90	Fair source		Poor source	
		Moderate aluminum saturation	0.170	AASHTO GIN >8 (low soil strength)	0.000
		Slope 8 to 12%	0.959		
607:					
Aimeliik, bedded tuff substratum	90	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.890	Slopes 15 to 25%	0.320
608:					
Aimeliik, bedded tuff substratum	90	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Very low aluminum saturation	0.890	AASHTO GIN >8 (low soil strength)	0.000
609:					
Aimeliik, bedded tuff substratum	90	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.890		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
610:					
Aimeliik	45	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Rock fragment content	0.755		
		Very low aluminum saturation	0.890	Slopes >25%	0.000
Ollei	30	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40”	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock <20”	0.000		
611:					
Aimeliik	40	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Rock fragment content	0.755	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.890		
Ollei	35	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40”	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock <20”	0.000		
612:					
Babelthuap	55	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000		
		Moderate aluminum saturation	0.430		
Ngardmau	25	Fair source		Poor source	
		Moderate aluminum saturation	0.210	AASHTO GIN >8 (low soil strength)	0.000
		Moderate exchangeable bases	0.500		
		Fair textures	0.500		
Typic Udorthents	15	Fair source		Poor source	
		High aluminum saturation	0.090	AASHTO GIN >8 (low soil strength)	0.000
		Fair textures	0.500		
		Moderate exchangeable bases	0.500		
613:					
Babelthuap	55	Poor source		Poor source	
		Very low exchangeable bases	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.430		
		Slope 8 to 12%	0.959		
Ngardmau	25	Fair source		Poor source	
		Moderate aluminum saturation	0.210	AASHTO GIN >8 (low soil strength)	0.000
		Moderate exchangeable bases	0.500		
		Slope 8 to 12%	0.959		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
613:					
Typic Udorthents	15	Fair source		Poor source	
		High aluminum saturation	0.090	AASHTO GIN >8 (low soil strength)	0.000
		Fair textures	0.500		
		Moderate exchangeable bases	0.500		
614:					
Babelthuap	45	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Slopes >15%	0.000		
		Very low exchangeable bases	0.000	Slopes 15 to 25%	0.320
Ngardmau	30	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Slopes 15 to 25%	0.320
		Moderate aluminum saturation	0.210		
Typic Udorthents	20	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		High aluminum saturation	0.090	Slopes 15 to 25%	0.320
		Fair textures	0.500		
615:					
Chia	65	Poor source		Poor source	
		Saturation <1’ depth	0.000	Saturation <1’ depth	0.000
		OM >30%	0.000		
		EC >8 dS/m	0.000		
Insak	30	Poor source		Poor source	
		Calcium carbonates >40%	0.000	Depth to bedrock <40”	0.000
		Saturation <1’ depth	0.000	Saturation <1’ depth	0.000
		EC >8 dS/m	0.000		
616:					
Dechel	85	Poor source		Poor source	
		Unfavorable textures	0.000	Saturation <1’ depth	0.000
		Saturation <1’ depth	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.580		
617:					
Ilachetomel	75	Poor source		Poor source	
		Saturation <1’ depth	0.000	Saturation <1’ depth	0.000
		OM >30%	0.000		
		EC >8 dS/m	0.000		
Naniak	20	Poor source		Poor source	
		Rock fragment content	0.000	Saturation <1’ depth	0.000
		Saturation <1’ depth	0.000	AASHTO GIN 5 to 8 (soil strength)	0.222
		EC >8 dS/m	0.000		
618:					
Mesei	55	Poor source		Poor source	
		Saturation <1’ depth	0.000	Saturation <1’ depth	0.000
		OM of 15-30%	0.163	AASHTO GIN >8 (low soil strength)	0.000

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
618:					
Dechel	30	Poor source		Poor source	
		Saturation <1' depth	0.000	Saturation <1' depth	0.000
		Fair textures	0.500	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.580		
619:					
Nekken	60	Poor source		Poor source	
		Rock fragment content	0.000	Depth to bedrock <40"	0.000
		Slopes >15%	0.000	Slopes 15 to 25%	0.320
		Depth to bedrock 20 to 40"	0.122	AASHTO GIN 5 to 8 (soil strength)	0.778
Ollei	30	Poor source		Poor source	
		Rock fragment content	0.000	Depth to bedrock <40"	0.000
		Depth to bedrock <20"	0.000	Slopes 15 to 25%	0.320
		Slopes >15%	0.000		
620:					
Ngardmau	50	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		High aluminum saturation	0.090	Slopes >25%	0.000
		Fair textures	0.500		
Babelthuap	30	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Unfavorable textures	0.000		
		Very low exchangeable bases	0.000	Slopes >25%	0.000
Typic Udorthents	15	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		High aluminum saturation	0.090	Slopes >25%	0.000
		Fair textures	0.500		
621:					
Ngardmau	50	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		High aluminum saturation	0.090	AASHTO GIN >8 (low soil strength)	0.000
		Fair textures	0.500		
Babelthuap	30	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000		
Typic Udorthents	15	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		High aluminum saturation	0.090	AASHTO GIN >8 (low soil strength)	0.000
		Fair textures	0.500		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
622:					
Oxic Dystrudepts	90	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3′	0.080
		Saturation from 1 to 3′	0.080		
623:					
Oxic Dystrudepts	90	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Slopes >15%	0.000	Slopes >25%	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3′	0.080
624:					
Ngatpang	80	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3′	0.180
		Saturation from 1 to 3′	0.180		
625:					
Ngatpang	80	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3′	0.180
		Saturation from 1 to 3′	0.180		
626:					
Ngatpang	75	Poor source		Fair source	
		Unfavorable textures	0.000	Saturation from 1 to 3′	0.180
		Slopes >15%	0.000	Slopes 15 to 25%	0.320
		Very low exchangeable bases	0.000	AASHTO GIN 5 to 8 (soil strength)	0.778
627:					
Ngatpang	80	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3′	0.180
628:					
Ngedebus	75	Poor source		Good source	
		Calcium carbonates > 40%	0.000		
		Unfavorable textures	0.000		
		Sand fractions >85%	0.000		
629:					
Majuro	85	Poor source		Fair source	
		Calcium carbonates > 40%	0.000	Fragments >3″ = 25 to 50%	0.139
		Unfavorable textures	0.000		
		Rock fragment content	0.000		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
630:					
Ngersuul	80	Fair source		Poor source	
		Fair textures	0.500	AASHTO GIN >8 (low soil strength)	0.000
		Very low aluminum saturation	0.860	Saturation from 1 to 3′	0.891
		Saturation from 1 to 3′	0.891		
631:					
Odesangel	80	Poor source		Poor source	
		Calcium carbonates >40%	0.000	Saturation <1′ depth	0.000
		Unfavorable textures	0.000		
		Sand fractions >85%	0.000		
632:					
Ollei	50	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock <20″	0.000		
Nekken	30	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock 20 to 40″	0.222	Fragments >3″ = 25 to 50%	0.087
633:					
Ollei	55	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock <20″	0.000		
Nekken	25	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock 20 to 40″	0.242	Fragments >3″ = 25 to 50%	0.995
634:					
Ollei	50	Poor source		Poor source	
		Rock fragment content	0.000	Depth to bedrock <40″	0.000
		Depth to bedrock <20″	0.000	Slopes >25%	0.000
		Slopes >15%	0.000		
Rock outcrop	30	Not rated		Not rated	
635:					
Palau	85	Fair source		Poor source	
		Moderate aluminum saturation	0.420	AASHTO GIN >8 (low soil strength)	0.000
		Moderate exchangeable bases	0.500		
636:					
Palau	85	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.420		
		Moderate exchangeable bases	0.500		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
637:					
Palau	85	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.420	Slopes 15 to 25%	0.320
		Moderate exchangeable bases	0.500		
638:					
Palau	85	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Moderate aluminum saturation	0.300	AASHTO GIN >8 (low soil strength)	0.000
		Moderate exchangeable bases	0.500		
639:					
Palau	85	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Moderate aluminum saturation	0.420	AASHTO GIN >8 (low soil strength)	0.000
		Moderate exchangeable bases	0.500		
640:					
Palau, bedded tuff substratum	75	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.420		
		Moderate exchangeable bases	0.500		
641:					
Palau, bedded tuff substratum	75	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.420		
		Moderate exchangeable bases	0.500		
642:					
Palau, bedded tuff substratum	75	Poor source		Poor source	
		Slopes >15%	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.300	Slopes 15 to 25%	0.320
		Moderate exchangeable bases	0.500		
643:					
Palau, bedded tuff substratum	75	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.420		
644:					
Palau, bedded tuff substratum	75	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Moderate aluminum saturation	0.300		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
645:					
Peleliu	70	Poor source		Poor source	
		Unfavorable textures	0.000	Depth to bedrock <40”	0.000
		Rock fragment content	0.000		
		Depth to bedrock <20”	0.000		
646:					
Peleliu	60	Poor source		Poor source	
		Unfavorable textures	0.000	Depth to bedrock <40”	0.000
		Rock fragment content	0.000	Fragments >3” = 25 to 50%	0.456
		Depth to bedrock <20”	0.000		
Chelbacheb	25	Poor source		Poor source	
		Depth to bedrock <20”	0.000	Depth to bedrock <40”	0.000
		Rock fragment content	0.000	Fragments >3” = 25 to 50%	0.935
		OM >30%	0.000		
647:					
Peleliu	40	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40”	0.000
		Unfavorable textures	0.000	Slopes >25%	0.000
		Rock fragment content	0.000	Fragments >3” = 25 to 50%	0.316
Chelbacheb	30	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40”	0.000
		Depth to bedrock <20”	0.000	Slopes >25%	0.000
		Rock fragment content	0.000	Fragments >3” = 25 to 50%	0.935
Rock outcrop	25	Not rated		Not rated	
648:					
Tabecheding	85	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3’	0.056
		Saturation from 1 to 3’	0.056		
649:					
Tabecheding	80	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000	Saturation from 1 to 3’	0.056
		Saturation from 1 to 3’	0.056		
650:					
Aquic Dystrudepts	90	Poor source		Poor source	
		Unfavorable textures	0.000	Saturation <1’ depth	0.000
		Saturation <1’ depth	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Very low exchangeable bases	0.000		
651:					
Tabecheding	80	Poor source		Poor source	
		Unfavorable textures	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Slopes >15%	0.000	Saturation from 1 to 3’	0.056
		Very low exchangeable bases	0.000	Slopes 15 to 25%	0.320

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value
652:					
Aquic Dystrudepts	75	Poor source		Poor source	
		Unfavorable textures	0.000	Saturation <1′ depth	0.000
		Saturation <1′ depth	0.000	AASHTO GIN >8 (low soil strength)	0.000
		Slopes >15%	0.000	Slopes 15 to 25%	0.320
653:					
Typic Udorthents, 30 to 75 percent slopes	45	Poor source		Poor source	
		Slopes >15%	0.000	Slopes >25%	0.000
		Very low exchangeable bases	0.000	AASHTO GIN >8 (low soil strength)	0.000
		High aluminum saturation	0.120		
Typic Udorthents, 0 to 6 percent slopes	40	Fair source		Poor source	
		High aluminum saturation	0.090	AASHTO GIN >8 (low soil strength)	0.000
		Fair textures	0.500		
		Moderate exchangeable bases	0.500		
654:					
Typic Udorthents	45	Fair source		Poor source	
		High aluminum saturation	0.120	AASHTO GIN >8 (low soil strength)	0.000
		Moderate exchangeable bases	0.500		
		Fair textures	0.500		
Urban land	40	Not rated		Not rated	
655:					
Quarry	100	Not rated		Not rated	
656:					
Water, brackish	100	Not rated		Not rated	
657:					
Water, fresh	100	Not rated		Not rated	
659:					
Nekken, lower fertility	60	Poor source		Poor source	
		Rock fragment content	0.000	Depth to bedrock <40″	0.000
		Slopes >15%	0.000	Slopes 15 to 25%	0.320
		Depth to bedrock 20 to 40″	0.242	Fragments >3″ = 25 to 50%	0.586
Ollei, lower fertility	30	Poor source		Poor source	
		Depth to bedrock <20″	0.000	Depth to bedrock <40″	0.000
		Slopes >15%	0.000	Slopes 15 to 25%	0.320
		Moderate aluminum saturation	0.580		
660:					
Ollei, lower fertility	50	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Depth to bedrock <20″	0.000	Slopes >25%	0.000
		Very low aluminum saturation	0.810		

Table 8.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of topsoil		Potential as source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
660:					
Rock outcrop	30	Not rated		Not rated	
661:					
Ollei, lower fertility	60	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock <20″	0.000		
Nekken, lower fertility	25	Poor source		Poor source	
		Slopes >15%	0.000	Depth to bedrock <40″	0.000
		Rock fragment content	0.000	Slopes >25%	0.000
		Depth to bedrock 20 to 40″	0.242	Fragments >3″ = 25 to 50%	0.995

Table 9.--Sanitary Facilities

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage lagoons: Limitation	Value
600:					
Aimeliik	85	Somewhat limited		Somewhat limited	
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Slopes 2 to 8%	0.33
				Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
601:					
Aimeliik	85	Somewhat limited		Very limited	
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Slopes >8%	1.00
				Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
		Slope	0.04		
602:					
Aimeliik	85	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
603:					
Aimeliik	85	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
604:					
Aimeliik	85	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
605:					
Aimeliik, bedded tuff substratum	85	Somewhat limited		Somewhat limited	
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Slopes 2 to 8%	0.33
				Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
606:					
Aimeliik, bedded tuff substratum	90	Somewhat limited		Very limited	
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Slopes >8%	1.00
				Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
		Slope	0.04		
607:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderate (0.6 to <2.0 in/hr)	0.43	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
608:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
609:					
Aimeliik, bedded tuff substratum	90	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
610:					
Aimeliik	45	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderate (0.6 to <2.0 in/hr)	0.43	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
Ollei	30	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40” depth	1.00
		Slope	1.00		
		Seepage, bottom layer	1.00	Slopes >8%	1.00
				Permeability >2”/hr (seepage)	1.00
611:					
Aimeliik	40	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.39	Permeability .6-2”/hr (some seepage)	0.18
		Smearing hazard	0.16		
Ollei	35	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40” depth	1.00
		Slope	1.00		
		Restricted permeability because of bedrock or a hardpan	1.00	Slopes >8%	1.00
				Fragments (>3”) >35%	1.00
612:					
Babelthuap	55	Somewhat limited		Somewhat limited	
		Smearing hazard	0.52	Slopes 2 to 8%	0.33
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Ngardmau	25	Somewhat limited		Somewhat limited	
		Smearing hazard	0.52	Slopes 2 to 8%	0.17
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Typic Udorthents	15	Somewhat limited		Somewhat limited	
		Smearing hazard	0.52	Slopes 2 to 8%	0.33
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
613:					
Babelthuap	55	Somewhat limited		Very limited	
		Smearing hazard	0.52	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
		Slope	0.04		
Ngardmau	25	Somewhat limited		Very limited	
		Smearing hazard	0.52	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
		Slope	0.04		

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage lagoons: Limitation	Value
613:					
Typic Udorthents	15	Somewhat limited		Very limited	
		Smearing hazard	0.52	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
		Slope	0.04		
614:					
Babelthuap	45	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Ngardmau	30	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Typic Udorthents	20	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
615:					
Chia	65	Very limited		Very limited	
		Flooding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Permeability >2”/hr (seepage)	1.00
		Filtering capacity	1.00	High organic matter (PT) in 50 to 150 cm	1.00
Insak	30	Very limited		Very limited	
		Flooding	1.00	Bedrock (hard) <40” depth	1.00
		Depth to bedrock	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Permeability >2”/hr (seepage)	1.00
			1.00		
616:					
Dechel	85	Very limited		Very limited	
		Flooding	1.00	Saturation at <3.5’ depth	1.00
		Ponding	1.00	Ponding (any duration)	1.00
		Depth to saturated zone	1.00	Flooding >= occasional	1.00
617:					
Ilachetomel	75	Very limited		Very limited	
		Flooding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	High organic matter (PT) in 50 to 150 cm	1.00
		Filtering capacity	1.00	Permeability >2”/hr (seepage)	1.00
Naniak	20	Very limited		Very limited	
		Flooding	1.00	Ponding (any duration)	1.00
		Ponding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Saturation at <3.5’ depth	1.00

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage lagoons: Limitation	Value
618:					
Mesei	55	Very limited		Very limited	
		Flooding	1.00	Ponding (any duration)	1.00
		Ponding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Permeability >2”/hr (seepage)	1.00
Dechel	30	Very limited		Very limited	
		Flooding	1.00	Saturation at <3.5’ depth	1.00
		Ponding	1.00		
		Depth to saturated zone	1.00	Ponding (any duration)	1.00
				Flooding >= occasional	1.00
619:					
Nekken	60	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40” depth	1.00
		Slope	1.00		
		Restricted permeability because of bedrock or a hardpan	1.00	Slopes >8%	1.00
				Permeability .6-2”/hr (some seepage)	0.53
Ollei	30	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40” depth	1.00
		Restricted permeability because of bedrock or a hardpan	1.00	Slopes >8%	1.00
		Slope	1.00	Fragments (>3”) 20-35%	0.02
620:					
Ngardmau	50	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.45		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Babelthuap	30	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.45		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Typic Udorthents	15	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
621:					
Ngardmau	50	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.45		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Babelthuap	30	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage lagoons: Limitation	Value
621:					
Typic Udorthents	15	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
622:					
Oxic Dystrudepts	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Saturation at <3.5' depth	1.00
		Smearing hazard	0.52		
		Very slow (0.0015 to < 0.06 in/hr)	0.15	Slopes 2 to 8%	0.33
623:					
Oxic Dystrudepts	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Saturation at <3.5' depth	1.00
		Slope	1.00		
		Smearing hazard	0.45	Slopes >8%	1.00
624:					
Ngatpang	80	Very limited		Very limited	
		Depth to saturated zone	1.00	Saturation at <3.5' depth	1.00
		Smearing hazard	0.45		
		Very slow (0.0015 to < 0.06 in/hr)	0.15	Permeability .6-2"/hr (some seepage)	0.53
				Slopes 2 to 8%	0.33
625:					
Ngatpang	80	Very limited		Very limited	
		Depth to saturated zone	1.00	Saturation at <3.5' depth	1.00
		Smearing hazard	0.45		
		Very slow (0.0015 to < 0.06 in/hr)	0.15	Slopes >8%	1.00
				Permeability .6-2"/hr (some seepage)	0.53
626:					
Ngatpang	75	Very limited		Very limited	
		Depth to saturated zone	1.00	Saturation at <3.5' depth	1.00
		Slope	1.00		
		Smearing hazard	0.45	Slopes >8%	1.00
				Permeability .6-2"/hr (some seepage)	0.53
627:					
Ngatpang	80	Very limited		Very limited	
		Depth to saturated zone	1.00	Saturation at <3.5' depth	1.00
		Slope	1.00		
		Smearing hazard	0.45	Slopes >8%	1.00
				Permeability .6-2"/hr (some seepage)	0.53
628:					
Ngedebus	75	Very limited		Very limited	
		Flooding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Permeability >2"/hr (seepage)	1.00
		Filtering capacity	1.00		

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
629:					
Majuro	85	Very limited		Very limited	
		Flooding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Permeability >2"/hr (seepage)	1.00
		Filtering capacity	1.00	Fragments (>3") >35%	1.00
630:					
Ngersuul	80	Very limited		Very limited	
		Flooding	1.00	Saturation at <3.5' depth	1.00
		Depth to saturated zone	1.00	Flooding >= occasional	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
631:					
Odesangel	80	Very limited		Very limited	
		Flooding	1.00	Ponding (any duration)	1.00
		Ponding	1.00	Flooding >= occasional	1.00
		Depth to saturated zone	1.00	Permeability >2"/hr (seepage)	1.00
632:					
Ollei	50	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Restricted permeability because of bedrock or a hardpan	1.00	Fragments (>3") 20-35%	0.93
Nekken	30	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Content of large stones	1.00	Fragments (>3") >35%	1.00
633:					
Ollei	55	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Seepage, bottom layer	1.00	Permeability >2"/hr (seepage)	1.00
Nekken	25	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Content of large stones	0.45	Fragments (>3") 20-35%	0.96
634:					
Ollei	50	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Restricted permeability because of bedrock or a hardpan	1.00	Slopes >8%	1.00
		Content of large stones	1.00	Fragments (>3") 20-35%	0.46
Rock outcrop	30	Not rated		Not rated	

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage lagoons: Limitation	Value
635:					
Palau	85	Somewhat limited		Somewhat limited	
		Smearing hazard	0.52	Slopes 2 to 8%	0.33
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
636:					
Palau	85	Somewhat limited		Very limited	
		Smearing hazard	0.45	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
		Slope	0.04		
637:					
Palau	85	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
638:					
Palau	85	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
639:					
Palau	85	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
640:					
Palau, bedded tuff substratum	75	Somewhat limited		Somewhat limited	
		Smearing hazard	0.45	Slopes 2 to 8%	0.33
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
641:					
Palau, bedded tuff substratum	75	Somewhat limited		Very limited	
		Smearing hazard	0.45	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
		Slope	0.04		
642:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
643:					
Palau, bedded tuff substratum	75	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.45		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage lagoons: Limitation	Value
644:					
Palau, bedded tuff substratum-----	75	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.45		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
645:					
Peleliu---------------------------	70	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Seepage bottom layer	1.00	Permeability >2"/hr (seepage)	1.00
		Karst topography	1.00	Fragments (>3") 20-35%	0.28
646:					
Peleliu---------------------------	60	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Content of large stones	1.00	Fragments (>3") >35%	1.00
		Seepage, bottom layer	1.00	Permeability >2"/hr (seepage)	1.00
Chelbacheb------------------------	25	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Content of large stones	1.00	Permeability >2"/hr (seepage)	1.00
		Seepage, bottom layer	1.00	Slopes >8%	1.00
647:					
Peleliu---------------------------	40	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Content of large stones	1.00	Permeability >2"/hr (seepage)	1.00
Chelbacheb------------------------	30	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Content of large stones	1.00	Permeability >2"/hr (seepage)	1.00
Rock outcrop----------------------	25	Not rated		Not rated	
648:					
Tabecheding-----------------------	85	Very limited		Very limited	
		Ponding	1.00	Saturation at <3.5' depth	1.00
		Depth to saturated zone	1.00	Ponding (any duration)	1.00
		Smearing hazard	0.45	Fragments (>3") 20-35%	0.92
649:					
Tabecheding-----------------------	80	Very limited		Very limited	
		Ponding	1.00	Saturation at <3.5' depth	1.00
		Depth to saturated zone	1.00	Ponding (any duration)	1.00
		Smearing hazard	0.45	Slopes >8%	1.00

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
650:					
Aquic Dystrudepts	90	Very limited		Very limited	
		Ponding	1.00	Saturation at <3.5' depth	1.00
		Depth to saturated zone	1.00	Ponding (any duration)	1.00
		Smearing hazard	0.45	Slopes >8%	1.00
651:					
Tabecheding	80	Very limited		Very limited	
		Ponding	1.00	Saturation at <3.5' depth	1.00
		Depth to saturated zone	1.00	Ponding (any duration)	1.00
		Slope	1.00	Slopes >8%	1.00
652:					
Aquic Dystrudepts	75	Very limited		Very limited	
		Ponding	1.00	Saturation at <3.5' depth	1.00
		Depth to saturated zone	1.00	Ponding (any duration)	1.00
		Slope	1.00	Slopes >8%	1.00
653:					
Typic Udorthents, 30 to 75 percent slopes	45	Very limited		Very limited	
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52		
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
Typic Udorthents, 0 to 6 percent slopes	40	Somewhat limited		Somewhat limited	
		Smearing hazard	0.52	Slopes 2 to 8%	0.33
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
654:					
Typic Udorthents	45	Somewhat limited		Very limited	
		Smearing hazard	0.52	Slopes >8%	1.00
		Moderately slow (0.2 to <0.6 in/hr)	0.35		
		Slope	0.16		
Urban land	40	Not rated		Not rated	
655:					
Quarry	100	Not rated		Not rated	
656:					
Water, brackish	100	Not rated		Not rated	
657:					
Water, fresh	100	Not rated		Not rated	
659:					
Nekken, lower fertility	60	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Content of large stones	1.00	Slopes >8%	1.00
		Slope	1.00	Fragments (>3") >35%	1.00

Table 9.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
659:					
Ollei, lower fertility	30	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Restricted permeability because of bedrock or a hardpan	1.00	Slopes >8%	1.00
		Slope	1.00		
660:					
Ollei, lower fertility	50	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Restricted permeability because of bedrock or a hardpan	1.00	Permeability .6-2"/hr (some seepage)	0.53
Rock outcrop	30	Not rated		Not rated	
661:					
Ollei, lower fertility	60	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Seepage, bottom layer	1.00	Permeability >2"/hr (seepage)	1.00
Nekken, lower fertility	25	Very limited		Very limited	
		Depth to bedrock	1.00	Bedrock (hard) <40" depth	1.00
		Slope	1.00	Slopes >8%	1.00
		Smearing hazard	0.52	Fragments (>3") 20-35%	0.96

Table 10.--Landfills

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
600:							
Aimeliik------------	85	Not limited		Not limited		Very limited	
						Too clayey	1.00
601:							
Aimeliik------------	85	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.04	Too clayey	1.00
		Slope	0.04			Slope	0.04
602:							
Aimeliik------------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
603:							
Aimeliik------------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	0.50
604:							
Aimeliik------------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
605:							
Aimeliik, bedded tuff substratum----	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
606:							
Aimeliik, bedded tuff substratum----	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Slope	0.04	Too clayey	0.50
		Slope	0.04			Slope	0.04
607:							
Aimeliik, bedded tuff substratum----	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
608:							
Aimeliik, bedded tuff substratum----	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
609:							
Aimeliik, bedded tuff substratum----	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	1.00
610:							
Aimeliik------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
610:							
Ollei	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage, bottom layer	1.00			Gravel content	0.91
						Seepage	0.52
		Too clayey	0.50			Too clayey	0.50
		Content of large stones	0.02				
611:							
Aimeliik	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
Ollei	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Large stones	1.00			Large stones	1.00
		Too clayey	0.50			Too clayey	0.50
612:							
Babelthuap	55	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
Ngardmau	25	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
Typic Udorthents	15	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
613:							
Babelthuap	55	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.04	Too clayey	1.00
		Slope	0.04			Slope	0.04
Ngardmau	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04	Slope	0.04
Typic Udorthents	15	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.04	Too clayey	1.00
		Slope	0.04			Slope	0.04
614:							
Babelthuap	45	Very limited		Very limited		Very limited	
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00
Ngardmau	30	Very limited		Very limited		Very limited	
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00
Typic Udorthents	20	Very limited		Very limited		Very limited	
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
615:							
Chia	65	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Carbonate content	1.00
		Excess salt	1.00			Salinity	1.00
		Too sandy	0.50			Too sandy	0.50
Insak	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to bedrock	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to bedrock	1.00	Seepage	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to bedrock	1.00	Carbonate content	1.00
		Excess salt	1.00			Salinity	1.00
616:							
Dechel	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00				
617:							
Ilachetomel	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Organic matter content	1.00
		Organic matter content	1.00			Salinity	1.00
		Excess salt	1.00				
Naniak	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Excess sodium	1.00			Too acid	1.00
		Too acid	1.00			Gravel content	0.62
618:							
Mesei	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50	Seepage	1.00		
Dechel	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
619:							
Nekken	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Hard to compact	1.00
		Too clayey	0.50			Slope	1.00
		Content of large stones	0.01			Too clayey	0.50
						Content of large stones	0.01
Ollei	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Organic matter content	1.00			Seepage	1.00
		Content of large stones	0.97			Hard to compact	1.00
						Organic matter content	1.00
620:							
Ngardmau	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
Babelthuap	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
Typic Udorthents	15	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
621:							
Ngardmau	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
Babelthuap	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Typic Udorthents	15	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
622:							
Oxic Dystrudepts	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00			Too clayey	1.00
623:							
Oxic Dystrudepts	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00
624:							
Ngatpang	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to saturated zone	0.99

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
625:							
Ngatpang	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	0.04	Depth to saturated zone	0.99
		Slope	0.04			Slope	0.04
626:							
Ngatpang	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	1.00	Slope	1.00
		Slope	1.00			Depth to saturated zone	0.99
627:							
Ngatpang	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to saturated zone	0.99
628:							
Ngedebus	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Carbonate content	1.00
		Too sandy	1.00				
629:							
Majuro	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Carbonate content	1.00
		Too sandy	1.00			Content of large stones	0.81
		Content of large stones	0.81			Gravel content	0.17
630:							
Ngersuul	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.47
		Too clayey	0.50				
631:							
Odesangel	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Too sandy	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00			Carbonate content	1.00

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
632:							
Ollei	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Content of large stones	0.63			Content of large stones	0.63
		Too clayey	0.50			Too clayey	0.50
						Gravel content	0.37
Nekken	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Large stones	1.00			Large stones	1.00
		Too clayey	0.50			Too clayey	0.50
633:							
Ollei	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage, bottom layer	1.00			Gravel content	1.00
						Seepage	0.52
		Too clayey	0.50			Too clayey	0.50
Nekken	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
		Content of large stones	0.45			Content of large stones	0.45
634:							
Ollei	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones	1.00	Slope	1.00	Large stones	1.00
		Slope	1.00			Slope	1.00
		Organic matter content	1.00			Seepage	1.00
						Organic matter content	1.00
Rock outcrop	30	Not rated		Very limited		Not rated	
				Depth to bedrock	1.00		
				Slope	1.00		
635:							
Palau	85	Not limited		Not limited		Not limited	
636:							
Palau	85	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.04	Too clayey	1.00
		Slope	0.04			Slope	0.04
637:							
Palau	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
638:							
Palau	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
639:							
Palau	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
640:							
Palau, bedded tuff substratum	75	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
641:							
Palau, bedded tuff substratum	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Slope	0.04	Too clayey	0.50
		Slope	0.04			Slope	0.04
642:							
Palau, bedded tuff substratum	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
643:							
Palau, bedded tuff substratum	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
644:							
Palau, bedded tuff substratum	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
645:							
Peleliu	70	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
		Seepage, bottom layer	1.00	Depth to bedrock	1.00	Content of large stones	0.83
		Content of large stones	0.83			Gravel content	0.76
		Too clayey	0.50			Seepage	0.52
						Too clayey	0.50
646:							
Peleliu	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
		Seepage, bottom layer	1.00	Depth to bedrock	1.00	Large stones	1.00
		Large stones	1.00	Slope	0.84	Slope	0.84
		Slope	0.84			Seepage	0.52
		Too clayey	0.50			Too clayey	0.50
Chelbacheb	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Seepage, bottom layer	1.00	Slope	0.84	Seepage	1.00
		Large stones	1.00			Large stones	1.00
		Organic matter content	1.00			Organic matter content	1.00
		Slope	0.84			Slope	0.84

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
647:							
Peleliu-------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Seepage	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Depth to bedrock	1.00	Large stones	1.00
		Large stones	1.00			Seepage	0.52
		Too clayey	0.50			Too clayey	0.50
Chelbacheb-----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage, bottom layer	1.00			Seepage	1.00
		Large stones	1.00			Large stones	1.00
		Organic matter content	1.00			Organic matter content	1.00
Rock outcrop--------	25	Not rated		Very limited		Not rated	
				Slope	1.00		
				Seepage	1.00		
				Depth to bedrock	1.00		
648:							
Tabecheding---------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	1.00			Too acid	1.00
		Too clayey	1.00			Too clayey	1.00
		Content of large stones	0.26			Content of large stones	0.26
649:							
Tabecheding---------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	1.00	Slope	0.04	Too acid	1.00
		Too clayey	1.00			Too clayey	1.00
		Content of large stones	0.13			Content of large stones	0.13
650:							
Aquic Dystrudepts---	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Slope	0.04	Too clayey	1.00
		Slope	0.04			Slope	0.04
651:							
Tabecheding---------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	1.00	Slope	1.00	Too acid	1.00
		Too clayey	1.00			Too clayey	1.00
		Slope	1.00			Slope	1.00

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
652:							
Aquic Dystrudepts	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00
653:							
Typic Udorthents, 30 to 75 percent Slopes	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00			Too clayey	1.00
Typic Udorthents, 0 to 6 percent slopes	40	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
654:							
Typic Udorthents	45	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.16	Too clayey	1.00
		Slope	0.16			Slope	0.16
Urban land	40	Not rated		Not rated		Not rated	
655:							
Quarry	100	Not rated		Very limited		Not rated	
				Slope	1.00		
656:							
Water, brackish	100	Not rated		Not rated		Not rated	
657:							
Water, fresh	100	Not rated		Not rated		Not rated	
659:							
Nekken, lower fertility	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones	1.00	Slope	1.00	Hard to compact	1.00
		Slope	1.00			Large stones	1.00
		Too clayey	0.50			Slope	1.00
						Too clayey	0.50
Ollei, lower fertility	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Organic matter content	1.00			Hard to compact	1.00
						Gravel content	0.93
						Seepage	0.52
660:							
Ollei, lower fertility	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Too clayey	0.50			Gravel content	1.00
						Too clayey	0.50

Table 10.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
660:							
Rock outcrop	30	Not rated		Very limited		Not rated	
				Slope	1.00		
				Depth to bedrock	1.00		
661:							
Ollei, lower fertility	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage, bottom layer	1.00			Gravel content	1.00
		Too clayey	0.50			Seepage	0.52
						Too clayey	0.50
Nekken, lower fertility	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Too clayey	0.50			Hard to compact	1.00
		Content of large stones	0.45			Too clayey	0.50
						Content of large stones	0.45

Table 11.--Water Management

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
600:							
Aimeliik	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.43	Hard to pack	0.07	Depth to water	1.00
		Slope	0.08				
601:							
Aimeliik	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.06	Depth to water	1.00
		Seepage	0.43				
602:							
Aimeliik	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.13	Depth to water	1.00
		Seepage	0.43				
603:							
Aimeliik	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.03	Depth to water	1.00
		Seepage	0.43				
604:							
Aimeliik	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.06	Depth to water	1.00
		Seepage	0.43				
605:							
Aimeliik, bedded tuff substratum	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.43	Hard to pack	0.09	Depth to water	1.00
		Slope	0.08				
606:							
Aimeliik, bedded tuff substratum	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.03	Depth to water	1.00
		Seepage	0.43				
607:							
Aimeliik, bedded tuff substratum	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.01	Depth to water	1.00
		Seepage	0.43				
608:							
Aimeliik, bedded tuff substratum	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.10	Depth to water	1.00
		Seepage	0.43				
609:							
Aimeliik, bedded tuff substratum	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.04	Depth to water	1.00
		Seepage	0.43				
610:							
Aimeliik	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.01	Depth to water	1.00
		Seepage	0.43				

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
610:							
Ollei	30	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Seepage	0.25		
				Content of large stones	0.02		
611:							
Aimeliik	40	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.08	Depth to water	1.00
		Seepage	0.43				
Ollei	35	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
				Content of large stones	1.00		
612:							
Babelthuap	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Hard to pack	0.29	Depth to water	1.00
		Seepage	0.03				
Ngardmau	25	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.03	Hard to pack	0.29	Depth to water	1.00
Typic Udorthents	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
613:							
Babelthuap	55	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.26	Depth to water	1.00
		Seepage	0.03				
Ngardmau	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.29	Depth to water	1.00
		Seepage	0.03				
Typic Udorthents	15	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
614:							
Babelthuap	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
Ngardmau	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.29	Depth to water	1.00
		Seepage	0.03				
Typic Udorthents	20	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
615:							
Chia	65	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Salinity	1.00	Salinity and saturated zone	1.00
				Seepage	0.09		
				Piping	0.02		
Insak	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Depth to hard bedrock	1.00
		Depth to bedrock	0.88	Salinity	1.00	Cutbanks cave	1.00
				Thin layer	0.88	Salinity and saturated zone	1.00
				Seepage	0.09		
				Piping	0.02		
616:							
Dechel	85	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.04	Ponding	1.00	Slow refill	0.28
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	0.28		
617:							
Ilachetomel	75	Very limited		Very limited		Very limited	
		Seepage	1.00	Organic matter content	1.00	Salinity and saturated zone	1.00
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Piping	1.00		
				Salinity	1.00		
				Seepage	0.09		
Naniak	20	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Ponding	1.00	Cutbanks cave	1.00
				Depth to saturated zone	1.00	Salinity and saturated zone	0.99
				Hard to pack	1.00	Slow refill	0.28
				Salinity	0.97		
618:							
Mesei	55	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	0.10
				Depth to saturated zone	1.00		
Dechel	30	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.04	Ponding	1.00	Slow refill	0.28
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	0.27		
619:							
Nekken	60	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	0.99	Depth to water	1.00
		Depth to bedrock	0.99	Content of large stones	0.01		
		Seepage	0.72				

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
619:							
Ollei	30	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
				Organic matter content	1.00		
				Content of large stones	0.97		
620:							
Ngardmau	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.30	Depth to water	1.00
		Seepage	0.03				
Babelthuap	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.30	Depth to water	1.00
		Seepage	0.03				
Typic Udorthents	15	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
621:							
Ngardmau	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.30	Depth to water	1.00
		Seepage	0.03				
Babelthuap	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.29	Depth to water	1.00
		Seepage	0.03				
Typic Udorthents	15	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
622:							
Oxic Dystrudepts	90	Somewhat limited		Very limited		Very limited	
		Slope	0.08	Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	0.93		
623:							
Oxic Dystrudepts	90	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	0.94		
624:							
Ngatpang	80	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.08	Depth to saturated zone	1.00	Slow refill	0.96
		Seepage	0.04			Cutbanks cave	0.10
				Hard to pack	0.59		
625:							
Ngatpang	80	Very limited		Very limited		Somewhat limited	
		Slope	1.00	Depth to saturated zone	1.00	Slow refill	0.28
		Seepage	0.72			Cutbanks cave	0.10
				Hard to pack	0.59		

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
626:							
Ngatpang-----------	75	Very limited		Very limited		Somewhat limited	
		Slope	1.00	Depth to saturated zone	1.00	Slow refill	0.96
		Seepage	0.04	Hard to pack	0.58	Cutbanks cave	0.10
627:							
Ngatpang-----------	80	Very limited		Very limited		Somewhat limited	
		Slope	1.00	Depth to saturated zone	1.00	Slow refill	0.28
		Seepage	0.72	Hard to pack	0.63	Cutbanks cave	0.10
628:							
Ngedebus-----------	75	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.96	Cutbanks cave	1.00
				Depth to saturated zone	0.09	Depth to saturated zone	0.54
629:							
Majuro-------------	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.96	Cutbanks cave	1.00
		Slope	0.08	Content of large stones	0.86	Content of large stones	0.86
				Depth to saturated zone	0.09	Depth to saturated zone	0.54
630:							
Ngersuul-----------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.04	Depth to saturated zone	0.86	Slow refill	0.96
				Hard to pack	0.39	Cutbanks cave	0.10
						Depth to saturated zone	0.06
631:							
Odesangel----------	80	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	1.00
				Depth to saturated zone	1.00		
				Seepage	0.60		
632:							
Ollei--------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Content of large stones	0.63		
Nekken-------------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Content of large stones	1.00	Depth to water	1.00
		Depth to bedrock	0.98	Thin layer	0.98		
		Seepage	0.72	Seepage	0.30		
633:							
Ollei--------------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Seepage	0.32		
Nekken-------------	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Thin layer	0.97	Depth to water	1.00
		Depth to bedrock	0.97	Content of large stones	0.45		
		Seepage	0.72				

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
634:							
Ollei	50	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
				Content of large stones	1.00		
				Organic matter content	1.00		
Rock outcrop	30	Very limited		Not rated		Not rated	
		Slope	1.00				
		Depth to bedrock	1.00				
635:							
Palau	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Hard to pack	0.21	Depth to water	1.00
		Seepage	0.03				
636:							
Palau	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.15	Depth to water	1.00
		Seepage	0.03				
637:							
Palau	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.20	Depth to water	1.00
		Seepage	0.03				
638:							
Palau	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.18	Depth to water	1.00
		Seepage	0.03				
639:							
Palau	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.21	Depth to water	1.00
		Seepage	0.03				
640:							
Palau, bedded tuff substratum	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Hard to pack	0.23	Depth to water	1.00
		Seepage	0.03				
641:							
Palau, bedded tuff substratum	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.20	Depth to water	1.00
		Seepage	0.03				
642:							
Palau, bedded tuff substratum	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.23	Depth to water	1.00
		Seepage	0.03				
643:							
Palau, bedded tuff substratum	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.14	Depth to water	1.00
		Seepage	0.03				

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
644:							
Palau, bedded tuff substratum---------	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.25	Depth to water	1.00
		Seepage	0.03				
645:							
Peleliu-------------	70	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Content of large stones	0.83		
				Seepage	0.55		
646:							
Peleliu-------------	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Content of large stones	1.00	Depth to water	1.00
		Depth to bedrock	1.00				
		Slope	1.00	Thin layer	1.00		
				Seepage	0.43		
Chelbacheb----------	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Organic matter content	1.00	Depth to water	1.00
		Slope	1.00				
				Content of large stones	1.00		
				Thin layer	1.00		
				Seepage	0.12		
647:							
Peleliu-------------	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Content of large stones	1.00	Depth to water	1.00
		Slope	1.00				
		Depth to bedrock	1.00	Thin layer	1.00		
Chelbacheb----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Organic matter content	1.00	Depth to water	1.00
		Depth to bedrock	1.00				
				Content of large stones	1.00		
				Thin layer	1.00		
				Seepage	0.12		
Rock outcrop--------	25	Very limited		Not rated		Not rated	
		Seepage	1.00				
		Slope	1.00				
		Depth to bedrock	1.00				
648:							
Tabecheding---------	85	Somewhat limited		Very limited		Very limited	
		Slope	0.08	Ponding	1.00	Depth to water	1.00
				Depth to saturated zone	1.00		
				Hard to pack	0.32		
				Content of large stones	0.01		
649:							
Tabecheding---------	80	Very limited		Very limited		Very limited	
		Slope	1.00	Ponding	1.00	Depth to water	1.00
				Depth to saturated zone	1.00		
				Hard to pack	0.22		

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
650:							
Aquic Dystrudepts---	90	Very limited		Very limited		Very limited	
		Slope	1.00	Ponding	1.00	Depth to water	1.00
				Depth to saturated zone	1.00		
				Hard to pack	0.95		
651:							
Tabecheding---------	80	Very limited		Very limited		Very limited	
		Slope	1.00	Ponding	1.00	Depth to water	1.00
				Depth to saturated zone	1.00		
				Hard to pack	0.16		
652:							
Aquic Dystrudepts---	75	Very limited		Very limited		Very limited	
		Slope	1.00	Ponding	1.00	Depth to water	1.00
		Seepage	0.04	Depth to saturated zone	1.00		
				Hard to pack	0.95		
653:							
Typic Udorthents, 30 to 75 percent slopes------------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
Typic Udorthents, 0 to 6 percent slopes	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Seepage	0.85	Depth to water	1.00
		Seepage	0.03	Hard to pack	0.30		
654:							
Typic Udorthents----	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.31	Depth to water	1.00
		Seepage	0.03				
Urban land----------	40	Somewhat limited		Not rated		Not rated	
		Slope	0.32				
655:							
Quarry--------------	100	Very limited		Not rated		Not rated	
		Slope	1.00				
656:							
Water, brackish-----	100	Not rated		Not rated		Not rated	
657:							
Water, fresh--------	100	Not rated		Not rated		Not rated	
659:							
Nekken, lower fertility----------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Content of large stones	1.00	Depth to water	1.00
		Depth to bedrock	0.97				
		Seepage	0.72	Thin layer	0.97		

Table 11.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
659:							
Ollei, lower fertility----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Organic matter content	1.00		
				Seepage	0.93		
660:							
Ollei, lower fertility----------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00				
Rock outcrop--------	30	Very limited		Not rated		Not rated	
		Slope	1.00				
		Depth to bedrock	1.00				
661:							
Ollei, lower fertility----------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Seepage	0.32		
Nekken, lower fertility----------	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Thin layer	0.97	Depth to water	1.00
		Depth to bedrock	0.97	Content of large stones	0.45		
		Seepage	0.72				

Table 12.--Engineering Properties

[Abbreviations used in the “USDA texture” column are described in table 13. PI means plasticity index]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	PI
	cm				*pct*	*pct*					*pct*	
600:												
Aimeliik---------	0-3	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	3-7	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	7-18	SIC	MH	A-7-5	0	0	87-100	87-100	80-100	77-100	75-85	15-25
	18-82	SIC	MH	A-7-5	0	0	88-100	88-100	81-100	78-100	70-75	15-25
	82-93	CL	MH	A-7-5	0	0	88-100	87-100	76-98	60-79	80-90	20-35
	93-200	L	MH	A-7-5	0	0	88-100	87-100	74-100	54-97	80-90	20-35
601:												
Aimeliik---------	0-3	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	3-12	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	12-86	SIC	MH	A-7-5	0	0	88-100	88-100	81-100	78-100	70-75	15-25
	86-200	SIC	MH	A-7-5	0	0	88-100	87-100	80-100	77-100	80-90	20-35
602:												
Aimeliik---------	0-3	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	3-12	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	12-26	SIL	MH	A-7-5	0	0	88-100	87-100	78-100	68-99	75-85	15-25
	26-52	SICL	MH	A-7-5	0	0	88-100	88-100	84-100	78-100	70-75	15-25
	52-200	SICL	MH	A-7-5	0	0	88-100	87-100	83-100	78-100	80-90	20-35
603:												
Aimeliik---------	0-7	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	7-12	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	12-96	SICL	MH	A-7-5	0	0	88-100	88-100	84-100	79-100	70-75	15-25
	96-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
604:												
Aimeliik---------	0-4	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	4-8	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	8-86	SICL	MH	A-7-5	0	0	88-100	88-100	84-100	78-100	70-75	15-25
	86-200	SIC	MH	A-7-5	0	0	88-100	87-100	80-100	77-100	80-90	20-35
605:												
Aimeliik, bedded tuff substratum	0-4	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	4-18	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	18-64	SIC	MH	A-7-5	0	0	88-100	88-100	81-100	78-100	70-75	15-25
	64-200	SICL	MH	A-7-5	0	0	88-100	87-100	83-100	78-100	80-90	20-35
606:												
Aimeliik, bedded tuff substratum	0-4	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	4-8	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	8-103	SICL	MH	A-7-5	0	0	88-100	88-100	84-100	79-100	70-75	15-25
	103-200	SIC	MH	A-7-5	0	0	88-100	87-100	80-100	77-100	80-90	20-35
607:												
Aimeliik, bedded tuff substratum	0-3	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	3-18	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	18-124	SICL	MH	A-7-5	0	0	88-100	88-100	84-100	78-100	70-75	15-25
	124-200	SICL	MH	A-7-5	0	0	88-100	87-100	83-100	78-100	80-90	20-35
608:												
Aimeliik, bedded tuff substratum	0-3	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	3-11	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	11-62	SICL	MH	A-7-5	0	0	88-100	88-100	84-100	78-100	70-75	15-25
	62-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	PI
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	cm				*pct*	*pct*					*pct*	
609:												
Aimeliik, bedded tuff substratum	0-5	SPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	5-21	SIL	OH	A-7-5	0	0	88-100	87-100	78-100	68-99	80-90	10-20
	21-89	SIC	MH	A-7-5	0	0	88-100	88-100	76-100	73-100	70-75	15-25
	89-200	SICL	MH	A-7-5	0	0	88-100	87-100	79-100	74-100	80-90	20-35
610:												
Aimeliik---------	0-7	SPM	PT	A-8	0	0-74	100	100	100	100	0-5	NP-4
	7-27	SIL	OH	A-7-5	0	0-23	86-100	85-100	77-100	67-99	80-90	10-20
	27-125	SICL	MH	A-7-5	0	0-22	87-100	86-100	82-100	77-100	70-75	15-25
	125-200	SIC	MH	A-7-5	0	0-23	86-100	85-100	75-100	71-100	80-90	20-35
Ollei------------	0-5	GRV-MPM	PT	A-8	0	74-82	100	100	20-50	20-50	0-5	NP-4
	5-15	GRV-HO-SIL	GC	A-2-4	0	0-35	25-40	22-37	20-37	17-35	25-35	5-10
	15-33	GRV-SICL	GC	A-2-4	0	22-31	28-52	25-50	24-50	22-49	25-35	5-10
	33-58	BR	---	---	0	0	0	0	0	0	0	NP
611:												
Aimeliik---------	0-4	MPM	PT	A-8	0	0	100	100	100	100	0-5	NP-4
	4-13	SIL	OH	A-7-5	0	0-23	86-100	85-100	77-100	67-99	80-90	10-20
	13-71	SICL	MH	A-7-5	0-15	0-22	87-100	86-100	82-100	77-100	70-75	15-25
	71-200	SIC	MH	A-7-5	0	0-23	86-100	85-100	79-100	76-100	80-90	20-35
Ollei------------	0-4	GRV-SPM	PT	A-8	0	58-82	100	100	20-50	20-50	0-5	NP-4
	4-18	GRV-HO-SIL	GC	A-2-4	0	0-35	25-40	22-37	20-37	17-35	25-35	5-10
	18-38	FLV-SICL	CL	A-4	31-41	31-41	100	100	91-100	84-99	25-35	5-10
	38-63	BR	---	---	0	0	0	0	0	0	0	NP
612:												
Babelthuap-------	0-7	GR-SIL	MH	A-7-5	0	0	40-67	38-66	36-66	32-66	50-60	10-20
	7-24	SICL	MH	A-7-5	0	0	71-100	70-100	67-100	62-100	65-85	25-30
	24-61	SIC	MH	A-7-5	0	0	90-100	89-100	78-100	75-100	70-85	25-30
	61-200	SIC	MH	A-7-5	0	0	88-100	88-100	76-100	73-100	80-90	20-35
Ngardmau---------	0-4	GR-SIL	CL	A-7-5	0	0	45-72	43-70	39-70	34-70	35-60	10-20
	4-29	GR-SICL	MH	A-7-5	0	0	45-72	43-70	37-70	34-70	70-80	25-30
	29-200	SIC	MH	A-7-5	0	0	61-100	59-100	51-100	49-100	80-90	20-35
Typic Udorthents	0-1	GR-SIL	CL	A-7-5	0	0	45-64	43-62	39-62	34-62	35-60	10-20
	1-3	GR-SIC	MH	A-7-5	0	0	42-68	40-67	34-67	33-67	80-90	20-35
	3-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
613:												
Babelthuap-------	0-12	GR-SIL	MH	A-7-5	0	0	40-67	38-66	36-66	32-66	50-60	10-20
	12-85	SICL	MH	A-7-5	0	0	89-100	89-100	85-100	79-100	65-85	25-30
	85-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
Ngardmau---------	0-4	SIL	CL	A-7-5	0-15	0	71-100	69-100	62-100	54-100	35-60	10-20
	4-45	GR-SICL	MH	A-7-5	0	0	65-90	63-90	54-90	50-89	70-80	25-30
	45-200	L	MH	A-7-5	0	0	88-100	88-100	71-100	51-83	80-90	20-35
Typic Udorthents	0-1	GR-SIL	CL	A-7-5	0	0	45-64	43-62	39-62	34-62	35-60	10-20
	1-3	GR-SIC	MH	A-7-5	0	0	42-68	40-67	34-67	33-67	80-90	20-35
	3-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	PI
	cm				*pct*	*pct*					*pct*	
614:												
Babelthuap-------	0-2	GR-SIL	MH	A-7-5	0	0	43-60	40-58	38-58	34-58	50-60	10-20
	2-92	SIC	MH	A-7-5	0	0	71-100	70-100	61-100	58-100	65-85	25-30
	92-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
Ngardmau---------	0-4	GR-SIL	CL	A-7-5	0	0	45-64	42-62	38-62	33-62	35-60	10-20
	4-29	SICL	MH	A-7-5	0	0	73-100	72-100	61-100	57-99	70-80	25-30
	29-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
Typic Udorthents	0-1	GR-SIL	CL	A-7-5	0	0	45-63	43-62	39-62	34-62	35-60	10-20
	1-3	GR-SIC	MH	A-7-5	0	0	42-68	40-66	34-66	33-66	80-90	20-35
	3-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
615:												
Chia-------------	0-51	PEAT	PT	A-8	0	0	100	100	100	100	0	NP
	51-74	PEAT	PT	A-8	0	0	100	100	100	100	0	NP
	74-94	GR-LS	SC-SM	A-1-b	0	0-9	80-91	52-74	37-64	11-27	0-32	2-9
	94-200	GRV-LS	GC-GM	A-1-b	0	9-18	50-60	28-52	20-45	6-19	16-32	2-9
Insak------------	0-8	PT-LS	SM	A-2-5	0	0	91-100	72-100	53-88	16-36	40-80	NP-5
	8-18	MK-LS	SM	A-2-5	0	0	91-100	72-100	53-88	16-36	20-70	NP-5
	18-46	MK-LS	SM	A-2-4	0	0-19	81-100	62-100	46-88	14-36	15-40	NP-5
	46-74	GR-LS	SM	A-1-b	0	0-10	67-100	51-100	37-88	11-36	10-25	NP-5
	74-99	BR	---	---	0	0	0	0	0	0	0	NP
616:												
Dechel-----------	0-6	SIC	MH	A-7-5	0	0	100	100	92-100	89-100	70-80	20-25
	6-18	C	MH	A-7-5	0	0	100	100	75-100	64-100	70-80	20-25
	18-200	C	MH	A-7-5	0	0	100	100	75-100	64-100	70-85	25-30
617:												
Ilachetomel------	0-41	PEAT	PT	A-8	0	0	100	100	100	100	0	NP
	41-200	PEAT	PT	A-8	0	0	100	100	100	100	0	NP
Naniak-----------	0-30	MK-SIL	OH	A-5	0	0-15	85-100	71-100	64-100	55-94	70-100	NP-5
	30-61	MK-L	OH	A-5	0	0-15	85-100	71-100	57-96	41-73	70-100	NP-5
	61-200	GR-L	SM	A-2-5	0	0-12	64-79	22-68	17-65	12-50	65-75	5-10
618:												
Mesei------------	0-21	MUCK	PT	A-8	0	0	100	100	90-100	80-90	75-100	NP-20
	21-77	MUCK	PT	A-8	0	0	100	100	85-100	78-88	75-100	NP-20
	77-200	SICL	MH	A-7-5	0	0	100	100	76-100	69-99	65-75	15-20
Dechel-----------	0-7	SIL	MH	A-7-5	0	0	100	100	90-100	79-94	70-80	20-25
	7-20	SICL	MH	A-7-5	0	0	100	100	96-100	89-99	70-80	20-25
	20-200	SICL	MH	A-7-5	0	0	100	100	96-100	89-99	70-85	25-30
619:												
Nekken-----------	0-3	SPM	PT	A-8	0	0	100	100	90-100	80-100	0-5	NP-4
	3-20	SIL	MH	A-7-5	0	0	100	100	90-100	79-100	60-70	15-25
	20-46	CBV-SICL	MH	A-7-5	0	36-49	39-67	36-65	35-65	33-65	50-70	10-30
	46-56	GRV-SICL	MH	A-7-5	0	47-64	44-71	42-70	32-70	29-66	60-70	10-25
	56-81	BR	---	---	0	0	0	0	0	0	0	NP
Ollei------------	0-4	SPM	PT	A-8	0	0-82	100	100	20-50	20-45	0-5	NP-4
	4-8	HO-SIL	OL	A-4	0	0-35	100	100	90-100	79-94	25-35	5-10
	8-14	GRV-SIL	GC	A-2-4	0	0-22	35-44	32-41	29-41	25-41	25-35	5-10
	14-21	FLX-SIL	CL	A-4	29-34	52-60	100	100	90-100	79-100	25-35	5-10
	21-46	BR	---	---	0	0	0	0	0	0	0	NP

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	PI
	cm				*pct*	*pct*					*pct*	
620:												
Ngardmau---------	0-4	SICL	CL	A-7-5	0	0	89-100	89-100	80-100	75-99	35-60	10-20
	4-12	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	70-80	25-30
	12-43	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	80-90	20-35
	43-200	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	80-90	20-35
Babelthuap-------	0-4	GR-SICL	GM	A-7-5	0	0	41-59	39-58	31-58	29-54	50-60	10-20
	4-20	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	65-85	25-30
	20-39	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	80-90	20-35
	39-200	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	80-90	20-35
Typic Udorthents	0-1	GR-SIL	CL	A-7-5	0	0	45-64	43-62	39-62	34-62	35-60	10-20
	1-3	GR-SIC	MH	A-7-5	0	0	42-68	40-67	34-67	33-67	80-90	20-35
	3-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
621:												
Ngardmau---------	0-4	GR-SICL	CL	A-7-5	0	0	46-72	44-70	37-70	35-70	35-60	10-20
	4-12	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	70-80	25-30
	12-43	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	80-90	20-35
	43-200	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	80-90	20-35
Babelthuap-------	0-6	GR-SIL	GM	A-7-5	0	0	41-59	39-58	37-58	32-58	50-60	10-20
	6-58	SIC	MH	A-7-5	0	0	100	100	87-100	84-100	65-85	25-30
	58-200	SICL	MH	A-7-5	0	0	100	100	96-100	89-100	80-90	20-35
Typic Udorthents	0-1	GR-SIL	CL	A-7-5	0	0	46-63	43-61	39-61	34-61	35-60	10-20
	1-3	GR-SIC	MH	A-7-5	0	0	43-69	40-67	35-67	34-67	80-90	20-35
	3-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
622:												
Oxic Dystrudepts	0-5	SIL	MH	A-5	0	0	100	91-100	82-100	71-100	80-90	5-15
	5-15	GRV-SICL	SM	A-2-7	0	0	100	20-67	19-67	18-67	75-85	20-30
	15-200	C	MH	A-7-5	0	0	100	88-100	66-100	56-100	80-100	30-45
623:												
Oxic Dystrudepts	0-2	SICL	MH	A-5	0	0	100	91-100	86-100	81-99	80-90	5-15
	2-13	SIC	MH	A-7-5	0	0	100	87-100	72-100	69-100	75-85	20-30
	13-43	C	MH	A-7-5	0	0	100	88-100	66-100	56-100	80-100	30-45
	43-200	C	MH	A-7-5	0	0	100	89-100	67-100	57-100	80-100	30-45
624:												
Ngatpang---------	0-15	SICL	MH	A-5	0	0	100	91-100	87-100	81-99	80-90	5-15
	15-48	SIC	MH	A-7-5	0	0	100	88-100	81-100	78-100	75-85	20-30
	48-114	C	MH	A-7-5	0	0	100	87-100	68-95	58-84	75-85	25-35
	114-200	C	MH	A-7-5	0	0	100	88-100	66-100	56-100	80-100	30-45
625:												
Ngatpang---------	0-6	SICL	MH	A-5	0	0	74-100	73-100	66-100	62-99	80-90	5-15
	6-12	GR-SICL	MH	A-5	0	0	49-100	47-100	45-100	42-99	80-90	5-15
	12-91	C	MH	A-7-5	0	0	87-100	87-100	65-100	55-100	75-85	20-30
	91-200	SIC	MH	A-7-5	0	0	100	100	92-100	89-100	80-100	30-45
626:												
Ngatpang---------	0-13	SICL	MH	A-5	0	0	100	91-100	86-100	81-99	80-90	5-15
	13-40	SIC	MH	A-7-5	0	0	100	87-100	81-100	77-100	75-85	20-30
	40-126	C	MH	A-7-5	0	0	100	86-100	67-100	58-100	75-85	25-35
	126-200	C	MH	A-7-5	0	0	100	66-100	49-100	42-100	80-100	30-45

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	PI
	cm				*pct*	*pct*					*pct*	
627:												
Ngatpang---------	0-10	SICL	MH	A-5	0	0	100	91-100	87-100	81-99	80-90	5-15
	10-85	SIC	MH	A-7-5	0	0	100	87-100	81-100	77-100	75-85	20-30
	85-120	SIC	MH	A-7-5	0	0	100	85-100	78-100	75-100	80-100	30-45
	120-200	C	MH	A-7-5	0	0	100	100	75-100	64-100	80-100	30-45
628:												
Ngedebus---------	0-1	SPM	PT	A-8	0	0-11	95-100	90-100	70-85	10-20	0-5	NP-4
	1-5	HO-FSL	SM	A-2-4	0	0-2	98-100	92-100	78-94	21-32	30-50	NP-4
	5-14	FSL	SM	A-2-4	0	0-2	98-100	92-100	79-91	29-37	20-35	NP-1
	14-46	FS	SP-SM	A-2-4	0	0-2	98-100	92-100	80-91	5-10	10-25	NP-4
	46-200	FS	SP-SM	A-2-4	0	0-11	90-100	58-100	51-92	6-14	5-15	NP-4
629:												
Majuro-----------	0-2	CBX-SPM	PT	A-8	0	70-85	55-70	5-60	5-50	0-10	0-5	NP-4
	2-5	CBX-FSL	SP-SM	A-2-4	0	26-46	54-71	8-61	6-58	2-20	0-50	NP-5
	5-14	CBX-FSL	SP-SM	A-2-4	0	26-46	54-71	8-61	6-56	2-18	20-35	NP-1
	14-33	CBX-FS	SP	A-2-4	0	26-46	54-71	8-61	7-56	0-6	0-25	NP-5
	33-200	CBX-FS	SP-SM	A-1-b	0	22-41	55-75	9-66	9-64	1-13	0-20	NP-5
630:												
Ngersuul---------	0-4	SPM	PT	A-8	0	0	100	100	90-100	80-90	0-5	NP-4
	4-10	SIL	MH	A-5	0	0	100	100	90-100	80-90	45-55	5-10
	10-51	SICL	MH	A-7-5	0	0	100	100	90-100	85-95	65-75	25-35
	51-200	SICL	MH	A-7-5	0	0	100	100	90-100	85-95	65-75	25-35
631:												
Odesangel--------	0-10	PEAT	PT	A-8	0	0	100	100	100	100	0-2	NP-1
	10-28	MPT	PT	A-8	0	0	100	100	100	100	0-2	NP-1
	28-45	MUCK	PT	A-8	0	0	100	100	100	100	0-2	NP-1
	45-200	GR-S	SP-SM	A-2-4	0	0	55-100	53-100	46-92	5-14	5-15	NP-4
632:												
Ollei------------	0-6	GRV-SPM	PT	A-8	0	0-82	25-50	20-50	20-50	20-45	0-5	NP-4
	6-17	GRV-HO-SIL	GC	A-2-4	0	0-35	25-40	22-37	20-37	17-35	25-35	5-10
	17-28	GRV-SICL	GC	A-2-4	0	0-31	28-44	25-41	24-41	22-41	25-35	5-10
	28-41	FLV-SICL	CL	A-4	22-29	40-52	100	100	91-100	84-99	25-35	5-10
	41-66	BR	---	---	0	0	0	0	0	0	0	NP
Nekken-----------	0-5	CB-SPM	PT	A-8	0	77-86	100	100	90-100	80-100	0-5	NP-4
	5-22	CB-SIL	MH	A-7-5	0	28-43	60-88	58-88	52-88	46-88	60-70	15-25
	22-61	CBX-SICL	GM	A-2-7	0	49-80	14-74	11-73	10-73	10-73	60-70	10-25
	61-86	BR	---	---	0	0	0	0	0	0	0	NP
633:												
Ollei------------	0-2	GRV-SPM	PT	A-8	0	0-82	25-50	20-50	20-50	20-45	0-5	NP-4
	2-7	GRV-HO-SIL	GC	A-2-4	0	0-35	25-40	22-37	20-37	17-35	25-35	5-10
	7-32	GRV-SICL	GC	A-2-4	0	0-31	28-44	25-41	24-41	22-41	25-35	5-10
	32-57	BR	---	---	0	0	0	0	0	0	0	NP
Nekken-----------	0-3	SPM	PT	A-8	0	0	100	100	90-100	80-100	0-5	NP-4
	3-16	SIL	MH	A-7-5	0	0	66-100	65-100	58-100	51-100	60-70	15-25
	16-27	CBV-SICL	MH	A-7-5	0	36-49	39-67	36-65	35-65	33-65	50-70	10-30
	27-62	CBV-SICL	MH	A-7-5	0	47-64	44-71	42-70	32-70	29-66	60-70	10-25
	62-87	BR	---	---	0	0	0	0	0	0	0	NP

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	PI
	cm				*pct*	*pct*					*pct*	
634:												
Ollei------------	0-5	GR-MPM	PT	A-8	0	75-85	100	100	20-50	20-50	0-5	NP-4
	5-10	GR-HO-SIL	GC	A-4	0	0-35	53-66	51-65	46-65	40-60	25-35	5-10
	10-20	FLV-SICL	CL	A-4	22-29	40-52	100	100	91-100	84-99	25-35	5-10
	20-45	BR	---	---	0	0	0	0	0	0	0	NP
Rock outcrop-----	0-200	BR	---	---	0	0	0	0	0	0	0	NP
635:												
Palau------------	0-19	SIL	MH	A-7-5	0	0	86-100	86-100	77-100	67-100	80-90	15-20
	19-31	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	31-52	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	52-200	L	MH	A-7-5	0	0	88-100	87-100	75-100	55-78	80-90	20-33
636:												
Palau------------	0-10	SICL	MH	A-7-5	0	0	86-100	86-100	73-100	68-99	80-90	15-20
	10-28	SICL	MH	A-7-5	0	0	86-100	86-100	82-100	77-100	80-90	15-20
	28-56	SIC	MH	A-7-5	0	0	89-100	88-100	77-100	74-100	80-85	25-30
	56-107	SIC	MH	A-7-5	0	0	89-100	88-100	77-100	74-100	80-85	25-30
	107-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-33
637:												
Palau------------	0-10	SIL	MH	A-7-5	0	0	86-100	86-100	77-100	67-100	80-90	15-20
	10-29	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	29-106	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	106-200	L	MH	A-7-5	0	0	88-100	87-100	75-100	55-83	80-90	20-33
638:												
Palau------------	0-4	SIL	MH	A-7-5	0	0	86-100	86-100	77-100	67-100	80-90	15-20
	4-150	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	150-200	L	MH	A-7-5	0	0	88-100	87-100	75-100	55-88	80-90	20-33
639:												
Palau------------	0-19	SIL	MH	A-7-5	0	0	86-100	86-100	77-100	67-100	80-90	15-20
	19-31	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	31-52	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	52-200	SICL	MH	A-7-5	0	0	88-100	87-100	83-100	78-100	80-90	20-33
640:												
Palau, bedded tuff substratum	0-13	SICL	MH	A-7-5	0	0	86-100	86-100	73-100	68-99	80-90	15-20
	13-51	SIC	MH	A-7-5	0	0	89-100	88-100	82-100	78-100	80-85	25-30
	51-200	SIC	MH	A-7-5	0	0	88-100	87-100	80-100	77-100	80-90	20-33
641:												
Palau, bedded tuff substratum	0-15	SICL	MH	A-7-5	0	0	86-100	86-100	73-100	68-99	80-90	15-20
	15-82	SIC	MH	A-7-5	0	0	89-100	88-100	82-100	78-100	80-85	25-30
	82-200	SICL	MH	A-7-5	0	0	88-100	87-100	83-100	78-100	80-90	20-33
642:												
Palau, bedded tuff substratum	0-5	SIL	MH	A-7-5	0	0	86-100	86-100	77-100	67-100	80-90	15-20
	5-81	SICL	MH	A-7-5	0	0	89-100	88-100	84-100	79-100	80-85	25-30
	81-200	SIL	MH	A-7-5	0	0	88-100	87-100	79-100	69-100	80-90	20-33

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	PI
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	cm				*pct*	*pct*					*pct*	
643:												
Palau, bedded tuff substratum	0-13	SICL	MH	A-7-5	0	0	86-100	86-100	73-100	68-99	80-90	15-20
	13-24	SICL	MH	A-7-5	0	0	87-100	87-100	74-100	69-99	80-90	15-20
	24-135	SIC	MH	A-7-5	0	0	89-100	88-100	82-100	78-100	80-85	25-30
	135-200	SIL	MH	A-7-5	0	0	88-100	87-100	79-100	69-100	80-90	20-33
644:												
Palau, bedded tuff substratum	0-6	SICL	MH	A-7-5	0	0	86-100	86-100	73-100	68-99	80-90	15-20
	6-58	SIC	MH	A-7-5	0	0	89-100	88-100	82-100	78-100	80-85	25-30
	58-200	SIC	MH	A-7-5	0	0	88-100	87-100	80-100	77-100	80-90	20-33
645:												
Peleliu----------	0-1	CBX-SPM	PT	A-8	0	59-81	20-45	20-45	15-45	15-40	0-5	NP-4
	1-13	CBX-CL	GC	A-2-6	0	23-73	35-45	30-40	20-35	20-30	30-50	10-20
	13-30	GRX-CL	GM	A-2-7	0	22-46	19-52	16-50	14-49	11-38	60-80	20-30
	30-55	BR	---	---	0	0	0	0	0	0	0	NP
646:												
Peleliu----------	0-5	CBX-SPM	PT	A-8	41-59	81-89	10-30	5-30	5-30	5-20	0-5	NP-4
	5-20	CBX-CL	GC	A-2-6	14-26	52-64	20-30	15-25	10-20	10-20	30-50	10-20
	20-40	CBX-CL	GM	A-2-7	0-11	31-61	15-57	12-55	11-55	8-45	60-80	20-30
	40-65	BR	---	---	0	0	0	0	0	0	0	NP
Chelbacheb-------	0-20	CBX-HPM	PT	A-8	0-59	59-70	25-45	25-45	20-45	20-45	0-5	NP-3
	20-40	BR	---	---	0	0	0	0	0	0	0	NP
647:												
Peleliu----------	0-5	CBX-MPM	PT	A-8	41-70	76-92	30-70	30-65	25-65	25-60	0-5	NP-4
	5-15	CBX-CL	GC	A-6	14-36	36-76	60-70	55-65	40-55	40-50	30-50	10-20
	15-27	CBX-CL	GM	A-7-5	12-31	39-72	36-72	33-71	30-71	22-58	60-80	20-30
	27-52	BR	---	---	0	0	0	0	0	0	0	NP
Chelbacheb-------	0-20	GRX-HPM	PT	A-8	0-59	59-70	25-45	25-45	20-45	20-45	0	NP
	20-40	BR	---	---	0	0	0	0	0	0	0	NP
Rock outcrop-----	0-200	BR	---	---	0	0	0	0	0	0	0	NP
648:												
Tabecheding------	0-10	SICL	MH	A-5	0	0	100	85-100	82-100	76-99	50-60	5-15
	10-73	CB-SIC	MH	A-7-5	0-33	0-17	72-100	72-100	66-100	63-100	80-100	20-40
	73-83	SIC	MH	A-7-5	0	0	74-100	74-100	68-100	66-100	80-100	20-35
	83-100	C	MH	A-7-5	0	0	87-100	87-100	65-100	55-100	80-100	20-35
	100-200	PGRV-SIC	MH	A-7-5	0-65	0	73-100	73-100	68-100	65-100	80-100	20-35
649:												
Tabecheding------	0-10	SICL	MH	A-5	0	0	100	85-100	82-100	76-99	50-60	5-15
	10-50	CB-SIC	MH	A-7-5	0-41	0-17	90-100	90-100	83-100	80-100	80-100	20-40
	50-60	SIC	MH	A-7-5	0	0	74-100	74-100	68-100	66-100	80-100	20-35
	60-90	C	MH	A-7-5	0	0	76-100	76-100	57-100	49-100	80-100	20-35
	90-200	PGRV-SIC	MH	A-7-5	0-65	0	73-100	73-100	68-100	65-100	80-100	20-35
650:												
Aquic Dystrudepts	0-10	GR-SICL	GM	A-7-5	0	0	62-82	47-73	45-73	42-73	75-85	20-30
	10-200	C	MH	A-7-5	0	0	100	87-100	65-100	55-100	80-100	30-45

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	PI
	cm				*pct*	*pct*					*pct*	
651:												
Tabecheding------	0-18	SICL	MH	A-5	0	0	100	85-100	82-100	76-99	50-60	5-15
	18-51	SIC	MH	A-7-5	0	0-13	87-100	87-100	80-100	77-100	80-100	20-40
	51-86	SIC	MH	A-7-5	0	0	76-100	76-100	70-100	68-100	80-100	20-35
	86-104	C	MH	A-7-5	0	0	76-100	76-100	57-100	49-100	80-100	20-35
	104-200	PGRV-SIC	MH	A-7-5	0-65	0	73-100	73-100	68-100	65-100	80-100	20-35
652:												
Aquic Dystrudepts	0-10	GR-SICL	GM	A-7-5	0	0	67-81	47-81	45-81	42-81	75-85	20-30
	10-65	C	MH	A-7-5	0	0	90-100	76-100	57-100	48-100	85-95	30-40
	65-200	C	MH	A-7-5	0	0	92-100	92-100	69-100	58-100	80-100	30-45
653:												
Typic Udorthents, 30 to 75 percent slopes---------	0-2	GRX-SIL	GP-GC	A-2-7	0	0	8-25	4-22	4-22	3-22	35-60	10-20
	2-12	GR-SIC	MH	A-7-5	0	0	46-72	44-70	38-70	37-70	80-90	20-35
	12-200	SIC	MH	A-7-5	0	0	100	100	92-100	89-100	80-90	20-35
Typic Udorthents, 0 to 6 percent slopes---------	0-4	GRX-SIL	GP-GM	A-2-4	0	0	11-25	7-22	6-22	5-22	35-60	10-20
	4-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
654:												
Typic Udorthents	0-1	GRX-SIL	GP-GC	A-2-4	0	0	11-25	7-22	6-22	5-22	35-60	10-20
	1-29	GR-SIC	MH	A-7-5	0	0	43-69	40-67	35-67	34-67	80-90	20-35
	29-200	SIC	MH	A-7-5	0	0	88-100	87-100	76-100	73-100	80-90	20-35
Urban land-------	0-200	CEM-MAT	---	---	0	0	0	0	0	0	0	NP
655:												
Quarry.												
656:												
Water, brackish.												
657:												
Water, fresh.												
659:												
Nekken, lower fertility-------	0-16	CBV-SIL	MH	A-7-5	0	57-62	54-81	52-81	49-81	20-81	60-70	15-25
	16-62	CBV-SICL	MH	A-7-5	0	49-55	61-85	59-85	44-85	41-80	50-70	10-30
	62-87	BR	---	---	0	0	0	0	0	0	0	NP
Ollei, lower fertility-------	0-8	SIL	OL	A-4	0	0-35	100	100	90-100	79-94	25-35	5-10
	8-14	GRV-SIL	GC	A-2-4	0	12-22	35-47	32-45	29-45	25-45	25-35	5-10
	14-21	FLX-SIL	GP-GC	A-2-4	0	0	9-18	5-15	5-15	4-15	25-35	5-10
	21-46	BR	---	---	0	0	0	0	0	0	0	NP
660:												
Ollei, lower fertility-------	0-18	SIL	CL	A-4	0	0-25	85-100	85-100	76-100	66-94	25-35	5-10
	18-28	GRV-SICL	GC	A-2-4	0	0	21-40	18-37	16-37	15-37	25-35	5-10
	28-43	FLX-SICL	SP-SC	A-2-4	0	0	100	3-10	3-10	3-10	25-35	5-10
	43-68	BR	---	---	0	0	0	0	0	0	0	NP

Table 12.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	PI
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	cm				*pct*	*pct*					*pct*	
660:												
Rock outcrop-----	0-200	BR	---	---	0	0	0	0	0	0	0	NP
661:												
Ollei, lower fertility-------	0-7	GRV-SIL	GC	A-2-4	0	0-35	25-40	22-37	20-37	17-35	25-35	5-10
	7-32	GRV-SICL	GC	A-2-4	0	0-31	28-44	25-41	24-41	22-41	25-35	5-10
	32-57	BR	---	---	0	0	0	0	0	0	0	NP
Nekken, lower fertility-------	0-16	SIL	MH	A-7-5	0	0	66-100	65-100	58-100	51-100	60-70	15-25
	16-27	CBV-SICL	MH	A-7-5	0	36-43	48-67	46-65	44-65	41-65	50-70	10-30
	27-62	CBV-SICL	MH	A-7-5	0	54-59	57-83	55-82	41-82	38-78	60-70	10-25
	62-87	BR	---	---	0	0	0	0	0	0	0	NP

Table 13.--Abbreviations Used in the Column "USDA Texture" in Table 12

USDA texture class terms	Terms used in lieu of USDA texture class terms	Texture modifiers*
C--clay	AM--artifactual material	ART--artifactual
CL--clay loam	BR—bedrock	ARTV--very artifactual
COS--coarse sand	BY--boulders	ARTX--extremely artifactual
COSL--coarse sandy loam	CB--cobbles	ASHY--ashy
FS--fine sand	CN--channers	BY--bouldery
FSL--fine sandy loam	FL--flagstones	BYV--very bouldery
L--loam	G--gravel	BYX--extremely bouldery
LCOS--loamy coarse sand	HPM--highly decomposed plant material	CB--cobbly
LFS--loamy fine sand	MAT--material	CBV--very cobbly
LS--loamy sand	MPM--moderately decomposed plant material	CBX--extremely cobbly
LVFS--loamy very fine sand	MPT--mucky peat	CEM--cemented
S--sand	MUCK--muck	CN--channery
SC--sandy clay	PBY--paraboulders	CNV--very channery
SCL--sandy clay loam	PCB--paracobbles	CNX--extremely channery
SI--silt	PCN--parachanners	COP--coprogenous
SIC--silty clay	PEAT--peat	DIA--diatomaceous
SICL--silty clay loam	PFL--paraflagstones	FL--flaggy
SIL--silt loam	PG--paragravel	FLV--very flaggy
SL--sandy loam	PST--parastones	FLX--extremely flaggy
VFS--very fine sand	SPM--slightly decomposed plant material	GR--gravelly
VFSL--very fine sandy loam	ST--stones	GRC--coarse gravelly
	UWB--unweathered bedrock	GRF--fine gravelly
	W--water	GRM--medium gravelly
	WB--weathered bedrock	GRV--very gravelly
		GRX--extremely gravelly
		GS--grassy
		GYP--gypsiferous
		HB--herbaceous
		HYDR--hydrous
		MEDL--medial
		MK--mucky
		MR--marly
		MS--mossy
		ORH--highly organic
		PBY--parabouldery
		PBYV--very parabouldery
		PBYX--extremely parabouldery
		PCB--paracobbly
		PCBV--very paracobbly
		PCBX--extremely paracobbly
		PCN--parachannery
		PCNV--very parachannery
		PCNX--extremely parachannery
		PF--permanently frozen
		PFL--paraflaggy
		PFLV--very paraflaggy
		PFLX--extremely paraflaggy
		PGR--paragravelly
		PGRV--very paragravelly
		PGRX--extremely paragravelly
		PST--parastony
		PSTV--very parastony
		PSTX--extremely parastony
		PT--peaty
		ST--stony
		SR--stratified
		STV--very stony
		STX--extremely stony
		WD--woody

* Some of the texture modifiers apply only to the USDA texture class terms or to the terms used in lieu of those texture class terms, and some apply to both. For further explanation, see part 618.68 of the "National Soil Survey Handbook" (http://soils.usda.gov/technical/handbook/contents/part618.html#68).

Table 14.--Physical Soil Properties

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	*pct*	*pct*	*pct*	*pct*	*g/cc*	*um/sec*	*cm/cm*	*pct*	*pct*
600:										
Aimeliik-----------	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-7	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	7-18	6	47	47	25-40	0.85-0.95	12-95	0.14-0.17	6-11	7-10
	18-82	6	47	47	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	82-93	33	33	34	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
	93-200	41	40	19	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
601:										
Aimeliik-----------	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-12	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	12-86	6	47	47	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	86-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
602:										
Aimeliik-----------	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-12	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	12-26	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	6-14
	26-52	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	52-200	10	56	34	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
603:										
Aimeliik-----------	0-7	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	7-12	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	12-96	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	96-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
604:										
Aimeliik-----------	0-4	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	4-8	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	8-86	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	86-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
605:										
Aimeliik, bedded tuff substratum---	0-4	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	4-18	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	18-64	6	47	47	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	64-200	10	56	34	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
606:										
Aimeliik, bedded tuff substratum---	0-4	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	4-8	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	8-103	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	103-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
607:										
Aimeliik, bedded tuff substratum---	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-18	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	18-124	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	124-200	10	56	34	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
608:										
Aimeliik, bedded tuff substratum---	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-11	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	11-62	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	62-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	*pct*	*pct*	*pct*	*pct*	*g/cc*	*um/sec*	*cm/cm*	*pct*	*pct*
609:										
Aimeliik, bedded tuff substratum---	0-5	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	5-21	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	21-89	6	47	47	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	89-200	10	56	34	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
610:										
Aimeliik-----------	0-7	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	7-27	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	27-125	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	125-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Ollei--------------	0-5	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	5-15	20	65	15	35-45	0.70-1.00	14-42	0.08-0.13	1-3	15-20
	15-33	10	56	34	25-30	0.90-1.10	14-42	0.10-0.13	1-3	8-12
	33-58	0	0	0	---	---	0-0.4	0	0	0
611:										
Aimeliik-----------	0-4	70	20	10	85-95	0.10-2.00	450-600	0.01-0.03	0-1	60-70
	4-13	20	65	15	25-40	0.85-0.95	12-95	0.14-0.17	6-11	9-17
	13-71	10	56	34	25-35	0.95-1.05	4.2-14	0.10-0.16	5-7	1-3
	71-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Ollei--------------	0-4	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	4-18	20	65	15	35-45	0.70-1.00	14-42	0.14-0.18	1-3	15-20
	18-38	10	56	34	35-45	0.70-1.00	4.2-14	0.05-0.08	1-3	1-5
	38-63	0	0	0	---	---	0-0.4	0	0	0
612:										
Babelthuap---------	0-7	20	65	15	20-45	0.80-1.10	12-95	0.08-0.12	0-3	1-4
	7-24	10	56	34	20-30	1.10-1.15	1.0-4.0	0.05-0.10	2-3	0.7-3
	24-61	6	47	47	20-30	1.10-1.15	1.0-4.0	0.05-0.10	3-5	0.6-2
	61-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Ngardmau-----------	0-4	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	4-29	10	56	34	25-33	1.10-1.15	1.0-4.0	0.06-0.12	3-4	0.0-0.7
	29-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Typic Udorthents---	0-1	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	1-3	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	3-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
613:										
Babelthuap---------	0-12	20	65	15	20-45	0.80-1.10	12-95	0.08-0.12	0-3	1-4
	12-85	10	56	34	20-30	1.10-1.15	1.0-4.0	0.05-0.10	2-3	0.7-3
	85-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Ngardmau-----------	0-4	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	4-45	10	56	34	25-33	1.10-1.15	1.0-4.0	0.06-0.12	3-4	0.0-0.7
	45-200	41	41	18	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
Typic Udorthents---	0-1	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	1-3	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	3-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
614:										
Babelthuap---------	0-2	20	65	15	20-45	0.80-1.10	12-95	0.08-0.12	0-3	1-4
	2-92	6	47	47	20-30	1.10-1.15	1.0-4.0	0.05-0.10	2-3	0.7-3
	92-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	pct	pct	pct	pct	g/cc	um/sec	cm/cm	pct	pct
614:										
Ngardmau-----------	0-4	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	4-29	10	56	34	25-33	1.10-1.15	1.0-4.0	0.06-0.12	3-4	0.0-0.7
	29-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
Typic Udorthents---	0-1	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	1-3	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	3-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
615:										
Chia---------------	0-51	82	12	6	50-100	0.10-0.30	100-600	0.15-0.45	0-1	70-90
	51-74	82	12	6	50-100	0.10-0.30	100-600	0.15-0.45	0-1	70-90
	74-94	82	12	6	0-5	1.20-1.40	43-141	0.02-0.07	0-1	0.0-3
	94-200	82	12	6	0-5	1.20-1.40	43-141	0.02-0.06	0-1	0.0-3
Insak--------------	0-8	82	12	6	20-30	1.10-1.30	43-141	0.08-0.12	0-1	15-25
	8-18	82	12	6	15-25	1.10-1.30	43-141	0.08-0.12	0-1	10-20
	18-46	82	12	6	5-15	1.10-1.40	43-141	0.08-0.10	0-1	2-8
	46-74	82	12	6	0-5	1.10-1.40	43-141	0.06-0.10	0-1	0.5-1
	74-99	0	0	0	---	---	14-100	0	0	0
616:										
Dechel-------------	0-6	6	47	47	35-45	0.50-0.80	1.4-4.2	0.20-0.35	0-3	3-9
	6-18	20	20	60	30-40	0.60-0.80	4.2-14	0.20-0.35	1-3	4-8
	18-200	20	20	60	30-35	0.60-0.90	1.4-4.2	0.20-0.40	0-3	2-6
617:										
Ilachetomel--------	0-41	82	12	6	50-100	0.10-0.30	100-600	0.15-0.45	0-1	70-90
	41-200	82	12	6	50-100	0.10-0.30	100-600	0.15-0.45	0-1	70-90
Naniak-------------	0-30	20	65	15	35-45	0.60-0.90	4.2-14	0.20-0.24	0-3	15-25
	30-61	41	41	18	20-25	0.60-0.90	4.2-14	0.20-0.24	0-3	10-20
	61-200	41	41	18	20-25	0.90-1.10	4.2-14	0.15-0.24	0-3	5-10
618:										
Mesei--------------	0-21	20	65	15	5-30	0.10-0.30	100-600	0.15-0.45	0-1	50-80
	21-77	20	65	15	5-30	0.10-0.30	100-600	0.15-0.45	0-1	20-40
	77-200	10	56	34	15-25	0.80-1.10	4.2-14	0.14-0.16	0-3	5-15
Dechel-------------	0-7	20	65	15	35-45	0.50-0.80	1.4-4.2	0.20-0.35	0-3	3-9
	7-20	10	56	34	30-40	0.60-0.80	4.2-14	0.20-0.35	1-3	4-8
	20-200	10	56	34	30-35	0.60-0.90	1.4-4.2	0.20-0.40	0-3	2-6
619:										
Nekken-------------	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-20	20	65	15	25-35	0.70-1.00	14-42	0.14-0.28	1-3	5-8
	20-46	10	56	34	25-30	1.10-1.15	4.0-14	0.14-0.17	3-6	0.7-1
	46-56	10	56	34	20-30	0.85-1.10	4.0-14	0.10-0.14	3-6	0.5-1
	56-81	0	0	0	---	---	0-0.4	0	0	0
Ollei--------------	0-4	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	4-8	20	65	15	35-45	0.70-1.00	14-42	0.14-0.18	1-3	15-20
	8-14	20	65	15	25-35	0.90-1.10	14-42	0.10-0.13	1-3	5-15
	14-21	20	65	15	25-35	0.70-1.00	4.0-14	0.05-0.08	1-3	1-3
	21-46	0	0	0	---	---	0-0.4	0	0	0
620:										
Ngardmau-----------	0-4	10	56	34	17-21	1.00-1.15	1.4-14	0.05-0.12	2-4	8-10
	4-12	6	47	47	25-33	1.10-1.15	1.0-4.0	0.06-0.12	3-4	0.0-0.7
	12-43	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	43-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	*pct*	*pct*	*pct*	*pct*	*g/cc*	*um/sec*	*cm/cm*	*pct*	*pct*
620:										
Babelthuap---------	0-4	10	56	34	20-45	0.80-1.10	1.4-14	0.08-0.12	0-3	1-4
	4-20	6	47	47	20-30	1.10-1.15	1.0-4.0	0.05-0.10	2-3	0.7-3
	20-39	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
	39-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Typic Udorthents---	0-1	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	1-3	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	3-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
621:										
Ngardmau-----------	0-4	10	56	34	17-21	1.00-1.15	1.4-14	0.05-0.12	2-4	8-10
	4-12	6	47	47	25-33	1.10-1.15	1.0-4.0	0.06-0.12	3-4	0.0-0.7
	12-43	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	43-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
Babelthuap---------	0-6	20	65	15	20-45	0.80-1.10	12-95	0.08-0.12	0-3	1-4
	6-58	6	47	47	20-30	1.10-1.15	1.0-4.0	0.05-0.10	2-3	0.7-3
	58-200	10	56	34	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.5-0.6
Typic Udorthents---	0-1	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	1-3	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	3-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
622:										
Oxic Dystrudepts---	0-5	20	65	15	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	5-15	10	56	34	35-40	0.90-0.95	4.2-14	0.25-0.27	14-15	0.8-2
	15-200	20	20	60	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
623:										
Oxic Dystrudepts---	0-2	10	56	34	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	2-13	6	47	47	35-40	0.90-0.95	4.2-14	0.25-0.27	14-15	0.8-2
	13-43	20	20	60	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
	43-200	20	20	60	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
624:										
Ngatpang-----------	0-15	10	56	34	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	15-48	6	47	47	35-40	0.90-0.95	4.2-14	0.25-0.27	14-15	0.8-2
	48-114	20	20	60	35-45	0.80-0.95	1.4-4.2	0.25-0.27	14-15	0.5-1
	114-200	20	20	60	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
625:										
Ngatpang-----------	0-6	10	56	34	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	6-12	10	56	34	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	12-91	20	20	60	35-40	0.90-0.95	4.2-14	0.25-0.27	14-15	0.8-2
	91-200	6	47	47	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
626:										
Ngatpang-----------	0-13	10	56	34	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	13-40	6	47	47	35-40	0.90-0.95	4.2-14	0.25-0.27	14-15	0.8-2
	40-126	20	20	60	35-45	0.80-0.95	1.4-4.2	0.25-0.27	14-15	0.5-1
	126-200	20	20	60	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
627:										
Ngatpang-----------	0-10	10	56	34	15-20	1.20-1.35	4.2-14	0.09-0.14	2-5	2-4
	10-85	6	47	47	35-40	0.90-0.95	4.2-14	0.25-0.27	14-15	0.8-2
	85-120	6	47	47	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5
	120-200	20	20	60	50-55	0.70-0.90	0.0-0.4	0.20-0.30	9-17	0.0-0.5

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	*pct*	*pct*	*pct*	*pct*	*g/cc*	*um/sec*	*cm/cm*	*pct*	*pct*
628:										
Ngedebus-----------	0-1	90	6	4	85-95	0.10-0.30	100-600	0.15-0.45	0-1	75-95
	1-5	75	14	11	20-25	1.20-1.40	142-200	0.05-0.07	0-1	8-13
	5-14	75	15	9	10-15	1.20-1.40	142-200	0.05-0.07	0-1	4-6
	14-46	94	4	2	0-5	1.20-1.40	142-200	0.05-0.07	0-1	0.0-0.5
	46-200	91	6	3	2-8	1.50-1.70	142-200	0.04-0.07	0-1	0.0-0.6
629:										
Majuro-------------	0-2	90	6	4	85-95	0.10-0.30	100-600	0.15-0.45	0-1	75-95
	2-5	75	14	11	20-25	1.20-1.40	142-200	0.05-0.07	0-1	5-10
	5-14	75	15	9	10-15	1.20-1.40	142-200	0.05-0.07	0-1	1-4
	14-33	94	4	2	0-5	1.20-1.40	142-200	0.05-0.07	0-1	0.0-0.5
	33-200	91	6	3	2-8	1.50-1.70	142-200	0.04-0.07	0-1	0.0-0.1
630:										
Ngersuul-----------	0-4	70	20	10	85-95	0.10-0.30	100-600	0.15-0.45	0-1	60-70
	4-10	20	65	15	5-15	0.70-0.90	14-42	0.20-0.30	0-3	5-8
	10-51	10	56	34	10-20	0.90-1.10	1.4-4.2	0.20-0.30	0-3	1-3
	51-200	10	56	34	30-45	0.60-0.90	1.4-4.2	0.20-0.30	0-3	1-3
631:										
Odesangel----------	0-10	90	6	4	95-100	0.10-0.30	300-700	0.15-0.45	0-1	85-95
	10-28	90	6	4	---	0.10-0.30	450-600	0.15-0.45	0-1	95-100
	28-45	90	6	4	---	0.10-0.30	100-400	0.15-0.45	0-1	60-70
	45-200	91	6	3	2-8	1.50-1.70	43-141	0.04-0.07	0-1	0.0-0.6
632:										
Ollei--------------	0-6	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	6-17	20	65	15	35-45	0.70-1.00	14-42	0.14-0.18	1-3	15-20
	17-28	10	56	34	25-30	0.90-1.10	14-42	0.10-0.13	1-3	8-12
	28-41	10	56	34	25-35	0.70-1.00	4.2-14	0.05-0.08	1-3	1-3
	41-66	0	0	0	---	---	0-0.4	0	0	0
Nekken-------------	0-5	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	5-22	20	65	15	25-35	0.70-1.00	14-42	0.14-0.28	1-3	5-8
	22-61	10	56	34	20-30	0.85-1.10	4.2-14	0.14-0.17	3-6	0.5-1
	61-86	0	0	0	---	---	0-0.4	0	0	0
633:										
Ollei--------------	0-2	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	2-7	20	65	15	35-45	0.70-1.00	14-42	0.08-0.13	1-3	15-20
	7-32	10	56	34	25-30	0.90-1.10	14-42	0.10-0.13	1-3	8-12
	32-57	0	0	0	---	---	0-0.4	0	0	0
Nekken-------------	0-3	70	20	10	85-95	0.10-0.10	600-700	0.01-0.03	0-1	60-70
	3-16	20	65	15	25-35	0.70-1.00	14-42	0.14-0.28	1-3	5-8
	16-27	10	56	34	25-30	1.10-1.15	4.2-14	0.14-0.17	3-6	0.7-1
	27-62	10	56	34	20-30	0.85-1.10	4.2-14	0.10-0.14	3-6	0.5-1
	62-87	0	0	0	---	---	0-0.4	0	0	0
634:										
Ollei--------------	0-5	70	20	10	85-95	0.10-0.20	450-600	0.01-0.03	0-1	60-70
	5-10	20	65	15	35-45	0.70-1.00	14-42	0.14-0.18	1-3	15-20
	10-20	10	56	34	25-35	0.70-1.00	4.2-14	0.05-0.08	1-3	1-3
	20-45	0	0	0	---	---	0-0.4	0	0	0
Rock outcrop-------	0-200	0	0	0	---	---	0-0.4	0	0	0

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	*pct*	*pct*	*pct*	*pct*	*g/cc*	*um/sec*	*cm/cm*	*pct*	*pct*
635:										
Palau--------------	0-19	20	65	15	40-50	0.80-0.90	12-95	0.08-0.12	1-3	9-12
	19-31	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	31-52	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	52-200	41	41	18	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
636:										
Palau--------------	0-10	10	56	34	40-50	0.80-0.90	12-95	0.08-0.12	1-3	9-12
	10-28	10	56	34	40-50	0.80-0.90	1.0-4.0	0.08-0.12	1-3	7-11
	28-56	6	47	47	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	56-107	6	47	47	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	107-200	6	47	47	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
637:										
Palau--------------	0-10	20	65	15	40-50	0.80-0.90	12-95	0.08-0.12	1-3	9-12
	10-29	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	29-106	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	106-200	41	41	18	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
638:										
Palau--------------	0-4	20	65	15	40-50	0.80-0.90	12-95	0.08-0.12	1-3	9-12
	4-150	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	150-200	41	41	18	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
639:										
Palau--------------	0-19	20	65	15	40-50	0.80-0.90	12-95	0.08-0.12	1-3	9-12
	19-31	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	31-52	10	56	34	35-40	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	52-200	10	56	34	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
640:										
Palau, bedded tuff substratum--------	0-13	10	56	34	35-45	0.80-0.90	12-95	0.14-0.23	5-14	9-12
	13-51	6	47	47	30-35	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	51-200	6	47	47	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
641:										
Palau, bedded tuff substratum--------	0-15	10	56	34	35-45	0.80-0.90	12-95	0.14-0.23	5-14	9-12
	15-82	6	47	47	30-35	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	82-200	10	56	34	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
642:										
Palau, bedded tuff substratum--------	0-5	20	65	15	35-45	0.80-0.90	12-95	0.14-0.23	5-14	9-12
	5-81	10	56	34	30-35	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	81-200	20	65	15	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
643:										
Palau, bedded tuff substratum--------	0-13	10	56	34	35-45	0.80-0.90	12-95	0.14-0.23	5-14	9-12
	13-24	10	56	34	35-45	0.85-0.95	12-95	0.08-0.15	7-10	3-5
	24-135	6	47	47	30-35	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	135-200	20	65	15	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6
644:										
Palau, bedded tuff substratum--------	0-6	10	56	34	35-45	0.80-0.90	12-95	0.14-0.23	5-14	9-12
	6-58	6	47	47	30-35	1.00-1.10	1.0-4.0	0.04-0.06	6-9	0.8-2
	58-200	6	47	47	25-35	0.90-0.97	1.4-14	0.05-0.06	4-7	0.1-0.6

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	pct	pct	pct	pct	g/cc	um/sec	cm/cm	pct	pct
645:										
Peleliu------------	0-1	20	65	15	---	0.10-0.30	100-600	0.01-0.03	0-1	70-80
	1-13	33	33	34	85-90	0.70-0.90	42-141	0.04-0.08	1-3	12-16
	13-30	35	37	28	50-60	0.90-1.10	14-42	0.05-0.12	1-3	6-14
	30-55	0	0	0	---	---	100-150	0	0	0
646:										
Peleliu------------	0-5	20	65	15	---	0.10-0.30	100-600	0.01-0.03	0-1	70-80
	5-20	33	33	34	85-90	0.70-0.90	42-141	0.04-0.08	1-3	12-16
	20-40	35	37	28	50-60	0.90-1.10	14-42	0.05-0.12	1-3	6-14
	40-65	0	0	0	---	---	100-150	---	0	0
Chelbacheb---------	0-20	20	65	15	---	0.10-0.30	100-600	0.15-0.45	0-1	70-80
	20-40	0	0	0	---	---	100-150	0	0	0
647:										
Peleliu------------	0-5	20	65	15	---	0.10-0.30	100-600	0.01-0.03	0-1	70-80
	5-15	33	33	34	85-90	0.70-0.90	42-141	0.04-0.08	1-3	12-16
	15-27	35	37	28	50-60	0.90-1.10	14-42	0.05-0.12	1-3	6-14
	27-52	0	0	0	---	---	100-150	---	0	0
Chelbacheb---------	0-20	20	65	15	---	0.10-0.30	100-600	0.15-0.45	0-1	70-80
	20-40	0	0	0	---	---	100-150	0	0	---
Rock outcrop-------	0-200	0	0	0	---	---	100-150	---	----	0
648:										
Tabecheding--------	0-10	10	56	34	30-40	0.80-1.00	4.2-14	0.09-0.14	4-6	3-5
	10-73	6	47	47	40-50	0.80-1.00	0.4-1.4	0.25-0.27	6-8	0.6-2
	73-83	6	47	47	40-50	0.70-0.90	0.0-0.4	0.20-0.29	9-17	0.2-0.8
	83-100	20	20	60	40-50	0.70-0.90	0.0-0.4	0.15-0.25	9-17	0.1-0.5
	100-200	6	47	47	40-50	0.70-0.90	0.0-0.4	0.15-0.25	9-17	0.0-0.4
649:										
Tabecheding--------	0-10	10	56	34	30-40	0.80-1.00	4.2-14	0.09-0.14	4-6	3-5
	10-50	6	47	47	40-50	0.80-1.00	0.4-1.4	0.25-0.27	6-8	0.6-2
	50-60	6	47	47	40-50	0.70-0.90	0.0-0.4	0.20-0.29	9-17	0.2-0.8
	60-90	20	20	60	40-50	0.70-0.90	0.0-0.4	0.15-0.25	9-17	0.1-0.5
	90-200	6	47	47	40-50	0.70-0.90	0.0-0.4	0.15-0.25	9-17	0.0-0.4
650:										
Aquic Dystrudepts--	0-10	10	56	34	15-20	1.15-1.30	4.2-14	0.09-0.14	2-4	2-4
	10-200	20	20	60	50-55	0.70-0.80	0.0-0.4	0.15-0.18	9-17	0.0-0.2
651:										
Tabecheding--------	0-18	10	56	34	30-40	0.80-1.00	4.2-14	0.09-0.14	4-6	3-5
	18-51	6	47	47	40-50	0.80-1.00	0.4-1.4	0.25-0.27	6-8	0.6-2
	51-86	6	47	47	40-50	0.70-0.90	0.0-0.4	0.20-0.29	9-17	0.2-0.8
	86-104	20	20	60	40-50	0.70-0.90	0.0-0.4	0.15-0.25	9-17	0.1-0.5
	104-200	6	47	47	40-50	0.70-0.90	0.0-0.4	0.15-0.25	9-17	0.0-0.4
652:										
Aquic Dystrudepts--	0-10	10	56	34	15-20	1.15-1.30	4.2-14	0.09-0.14	2-4	2-4
	10-65	20	20	60	35-45	0.90-0.95	1.4-4.2	0.25-0.27	9-17	0.5-1
	65-200	20	20	60	50-55	0.70-0.80	0.0-0.4	0.15-0.18	9-17	0.0-0.2
653:										
Typic Udorthents, 30 to 75 percent slopes-----------	0-2	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	2-12	6	47	47	17-21	0.90-1.15	12-95	0.06-0.20	2-4	8-10
	12-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6

Table 14.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	15-bar water (moist)	Moist bulk density	Ksat	AWC	LEP	Organic matter
	cm	*pct*	*pct*	*pct*	*pct*	*g/cc*	*um/sec*	*cm/cm*	*pct*	*pct*
653:										
Typic Udorthents, 0 to 6 percent slopes-----------	0-4	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	4-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
654:										
Typic Udorthents---	0-1	20	65	15	17-21	1.00-1.15	12-95	0.05-0.12	2-4	8-10
	1-29	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
	29-200	6	47	47	30-35	0.90-0.97	1.4-14	0.06-0.20	4-7	0.0-0.6
Urban land---------	0-200	0	0	0	---	---	0-0.4	0	0	0
655:										
Quarry.										
656:										
Water, brackish.										
657:										
Water, fresh.										
659:										
Nekken, lower fertility---------	0-16	20	65	15	25-35	0.70-1.00	14-42	0.14-0.28	1-3	3-6
	16-62	10	56	34	25-30	1.10-1.15	4.2-14	0.14-0.17	3-6	0.7-1
	62-87	0	0	0	---	---	0-0.4	0	0	0
Ollei, lower fertility---------	0-8	20	65	15	35-45	0.70-1.00	14-42	0.14-0.18	1-3	8-12
	8-14	20	65	15	25-35	0.90-1.10	14-42	0.10-0.13	1-3	3-6
	14-21	20	65	15	0-5	0.70-1.00	4.2-14	0.05-0.08	0-3	1-5
	21-46	0	0	0	---	---	0-0.4	0	0	0
660:										
Ollei, lower fertility---------	0-18	20	65	15	35-45	0.70-1.00	14-42	0.14-0.18	1-3	8-12
	18-28	10	56	34	25-35	0.70-1.00	4.2-14	0.05-0.08	1-3	1-5
	28-43	10	56	34	25-35	0.70-1.00	4.2-14	0.05-0.08	1-3	1-5
	43-68	0	0	0	---	---	0-0.4	0	0	0
Rock outcrop-------	0-200	0	0	0	---	---	0-0.4	0	0	0
661:										
Ollei, lower fertility---------	0-7	20	65	15	35-45	0.70-1.00	14-42	0.08-0.13	1-3	8-12
	7-32	10	56	34	25-30	0.90-1.10	14-42	0.10-0.13	1-3	6-10
	32-57	0	0	0	---	---	0-0.4	0	0	0
Nekken, lower fertility---------	0-16	20	65	15	25-35	0.70-1.00	14-42	0.14-0.28	1-3	5-8
	16-27	10	56	34	25-30	1.10-1.15	4.2-14	0.14-0.17	3-6	0.7-1
	27-62	10	56	34	20-30	0.85-1.10	4.2-14	0.10-0.14	3-6	0.5-1
	62-87	0	0	0	---	---	0-0.4	0	0	0

Table 15.--Chemical Soil Properties

Map symbol and soil name	Hori-zon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extract-able aluminum	Aluminum satura-tion
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
600:									
Aimeliik--------	Oi	0-3	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	3-7	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	BA	7-18	4.7-5.4	17-30	7-14	6-20	35-67	0.1-5	1-36
	Bto	18-82	4.9-5.5	12-22	4-8	0.5-2	4-9	3-7	76-90
	BCt	82-93	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C	93-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
601:									
Aimeliik--------	Oi	0-3	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	3-12	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	12-86	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	86-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
602:									
Aimeliik--------	Oi	0-3	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	3-12	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	AB	12-26	4.7-5.4	15-25	6-12	7-22	49-90	0.1-5	2-42
	Bto	26-52	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	CBt	52-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
603:									
Aimeliik--------	Oi	0-7	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	AB	7-12	4.7-5.4	20-35	9-16	7-22	36-64	0.1-5	1-31
	Bto	12-96	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	96-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
604:									
Aimeliik--------	Oi	0-4	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	4-8	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	8-86	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	86-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
605:									
Aimeliik, bedded tuff substratum	Oi	0-4	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	4-18	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	18-64	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	64-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
606:									
Aimeliik, bedded tuff substratum	Oi	0-4	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	4-8	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	8-103	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	CBt	103-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
607:									
Aimeliik, bedded tuff substratum	Oi	0-3	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	3-18	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	18-124	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	CBt	124-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
608:									
Aimeliik, bedded tuff substratum	Oi	0-3	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	AB	3-11	4.7-5.4	20-35	9-16	7-22	36-64	0.1-5	1-31
	Bto	11-62	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	CBt	62-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Horizon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extractable aluminum	Aluminum saturation
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
609:									
Aimeliik, bedded tuff substratum	Oi	0-5	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	5-21	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	21-89	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	89-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
610:									
Aimeliik--------	Oe	0-7	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	7-27	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	27-125	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	125-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Ollei-----------	Oe	0-5	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	5-15	4.9-5.6	35-45	15-25	15-25	43-56	0.5-2	3-6
	AB	15-33	4.8-5.3	20-30	10-20	7-15	35-50	2-5	22-27
	R	33-58	---	---	---	---	---	---	---
611:									
Ollei-----------	Oi	0-4	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	4-18	4.9-5.6	35-45	15-25	15-25	43-56	0.5-2	3-6
	BC	18-38	4.9-5.6	19-25	10-16	5-6	26-24	5-10	50-62
	R	38-63	---	---	---	---	---	---	---
Aimeliik--------	Oe	0-4	5.6-6.5	80-115	85-95	80-115	100	0.1-0.3	0
	A	4-13	4.7-5.4	20-37	9-16	7-22	37-61	0.1-5	1-31
	Bto	13-71	4.9-5.5	12-22	4-8	0.5-2	4-7	3-7	76-90
	C	71-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
612:									
Babelthuap------	Ac	0-7	4.6-5.1	10-25	2-7	0.7-4	7-16	0.8-5	40-66
	Bto1	7-24	5.3-5.8	4-7	1	0.2-1	5-14	0.3-0.8	50-83
	Bto2	24-61	5.3-5.8	4-7	1	0.2-1	5-14	0.3-0.8	50-83
	C	61-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Ngardmau--------	Ac	0-4	4.9-5.5	12-16	4-7	0.2-0.5	2-3	2-6	50-80
	Bo	4-29	4.9-5.1	6-8	1-2	0.2-0.4	3-5	1-2	71-83
	C	29-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Typic Udorthents	Ac	0-1	4.9-5.5	12-16	3-7	0.2-0.5	2-3	2-6	83-90
	C1	1-3	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C2	3-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
613:									
Babelthuap------	Ac	0-12	4.7-5.1	10-25	2-7	0.7-4	7-16	0.8-5	40-66
	Bto	12-85	5.4-5.6	4-7	1	0.2-1	5-14	0.4-0.8	67-83
	CBt	85-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Ngardmau--------	Ac	0-4	4.9-5.5	12-16	4-7	0.2-0.5	2-3	3-6	75-80
	Bo	4-45	4.9-5.1	6-8	1-2	0.2-0.4	3-5	1-2	79-83
	C	45-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Typic Udorthents	Ac	0-1	4.9-5.5	12-16	4-7	0.2-0.5	2-3	3-6	75-90
	C1	1-3	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C2	3-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
614:									
Typic Udorthents	Ac	0-1	4.9-5.5	12-16	4-7	0.2-0.5	2-3	3-6	80-90
	C1	1-3	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C2	3-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Babelthuap------	ABc	0-2	4.7-5.1	10-25	2-7	0.7-4	7-16	0.8-5	40-66
	Bto	2-92	5.4-5.6	4-7	1	0.2-1	5-14	0.3-0.8	50-83
	C	92-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Horizon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extractable aluminum	Aluminum saturation
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
614:									
Ngardmau--------	Ac	0-4	4.9-5.5	12-16	4-7	0.2-0.5	2-3	2-6	71-80
	Bo	4-29	4.9-5.1	6-8	2	0.2-0.4	3-5	1-2	73-83
	C	29-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
615:									
Chia------------	Oi1	0-51	6.1-6.5	100-125	100-125	100-125	100	0.1	0
	Oi2	51-74	6.6-7.3	100-125	100-125	100-125	100	0.1	0
	2C1	74-94	7.0-7.8	0-2	---	40-45	100	0	---
	2C2	94-200	7.0-7.8	0-2	---	40-45	100	0	---
Insak-----------	A	0-8	7.4-8.4	0-25	0-2	50-70	100	0	---
	AC	8-18	7.4-8.4	0-2	---	40-45	100	0	---
	C1	18-46	7.4-8.4	0-2	---	40-45	100	0	---
	C2	46-74	7.4-8.4	0-2	---	40-45	100	0	---
	R	74-99	8.5-9.0	---	---	---	---	---	---
616:									
Dechel----------	A	0-6	5.1-5.6	20-35	10-16	5-24	27-69	4-7	40-45
	2Bg	6-18	4.5-5.5	20-35	11-17	4-13	20-37	2-4	16-24
	3Cg	18-200	3.4-5.5	15-32	11-18	4-15	25-47	2-5	18-28
617:									
Ilachetomel-----	Oi1	0-41	4.4-5.0	65-75	100-115	100-114	100	0.5-2	0-1
	Oi2	41-200	3.2-4.4	75-110	100-115	100-114	100	0.1-0.5	0
Naniak----------	A	0-30	4.5-5.0	36-65	27-47	36-62	100-96	2-8	6-16
	Cg1	30-61	3.5-4.4	30-55	18-38	25-51	83-93	3-9	17-24
	2Cg2	61-200	3.1-4.4	20-35	10-22	14-29	69-82	5-15	49-68
618:									
Mesei-----------	Oa1	0-21	4.5-5.5	65-75	65-75	65-75	100	0.2-2	0-3
	Oa2	21-77	4.5-5.5	30-40	30-40	30-40	100	0.2-2	1-5
	2Cg	77-200	3.5-4.5	25-36	12-18	10-22	40-61	2-5	15-28
Dechel----------	A	0-7	4.5-5.5	20-35	10-16	5-24	27-69	4-7	40-45
	2Bg	7-20	4.5-5.5	20-35	11-17	4-13	20-37	2-4	16-24
	3Cg	20-200	4.5-5.5	15-32	11-18	4-15	25-47	2-5	18-28
619:									
Ollei-----------	Oi	0-4	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	4-8	4.9-5.6	35-45	15-25	15-25	43-56	0.5-2	3-6
	Bw	8-14	4.9-5.6	20-30	10-20	7-15	35-50	2-5	22-27
	CB	14-21	4.9-5.6	19-25	9-16	4-6	21-24	5-10	56-62
	R	21-46	---	---	---	---	---	---	---
Nekken----------	Oi	0-3	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	3-20	4.9-5.9	40-50	15-20	15-25	38-50	0.5-1	3-5
	Bt	20-46	5.2-5.6	35-40	11-15	6-12	19-30	4-9	42-63
	C	46-56	5.1-5.4	30-35	8-10	4-7	13-20	4-8	56-80
	R	56-81	---	---	---	---	---	---	---
620:									
Typic Udorthents	Ac	0-1	4.9-5.5	12-16	4-7	0.2-0.5	2-3	3-6	86-90
	C1	1-3	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C2	3-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Ngardmau--------	BAc	0-4	4.9-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	Bo	4-12	4.9-5.1	6-8	1-2	0.2-0.4	3-5	1-2	79-83
	BC	12-43	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C	43-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Hori-zon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base sat-uration	Extract-able aluminum	Aluminum satura-tion
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
620:									
Babelthuap------	BAc	0-4	3.6-5.5	10-25	2-7	0.7-4	7-16	0.8-5	40-66
	Bto	4-20	5.4-5.6	4-7	1	0.2-1	5-14	0.4-0.8	67-83
	CBt	20-39	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C	39-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
621:									
Typic Udorthents	Ac	0-1	4.9-5.5	12-16	3-7	0.2-0.5	2-3	2-6	86-90
	C1	1-3	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C2	3-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Ngardmau--------	BAc	0-4	4.9-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	Bo	4-12	4.9-5.1	6-8	1-2	0.2-0.4	3-5	1-2	79-83
	BC	12-43	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
	C	43-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Babelthuap------	Ac	0-6	4.7-5.1	10-25	2-7	0.7-4	7-16	1-5	50-66
	Bto	6-58	5.4-5.6	4-7	1	0.2-1	5-14	0.3-0.8	50-83
	C	58-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
622:									
Oxic Dystrudepts	A	0-5	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	Bo	5-15	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	C	15-200	4.5-5.5	40-50	30-45	15-27	38-54	0.3-2	1-4
623:									
Oxic Dystrudepts	A	0-2	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	Bo	2-13	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	C1	13-43	4.5-5.5	40-50	30-45	15-27	38-54	0.3-2	1-4
	C2	43-200	4.5-5.5	40-50	30-45	12-27	30-54	0.3-2	1-4
624:									
Ngatpang--------	A	0-15	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	Bo1	15-48	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	Bo2	48-114	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	C	114-200	4.5-5.5	40-50	30-45	32-45	80-90	0.3-2	1-4
625:									
Ngatpang--------	A1	0-6	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	A2	6-12	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	Bo	12-91	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	C	91-200	4.5-5.5	40-50	30-45	32-45	80-90	0.3-2	1-4
626:									
Ngatpang--------	A	0-13	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	Bo1	13-40	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	Bo2	40-126	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	C	126-200	4.5-5.5	40-50	30-45	32-45	80-90	0.3-2	1-4
627:									
Ngatpang--------	A	0-10	4.5-5.5	5-9	3-5	0.5-3	10-29	1-4	36-70
	Bo	10-85	3.6-5.0	10-17	6-11	0.5-4	5-25	2-10	37-94
	BC	85-120	4.5-5.5	40-50	30-45	32-45	80-90	0.3-2	1-4
	CB	120-200	4.5-5.5	40-50	30-45	32-45	80-90	0.3-2	1-4
628:									
Ngedebus--------	Oi	0-1	7.0-7.2	75-95	---	75-95	100	0	---
	A1	1-5	7.4-7.8	20-30	---	60-70	100	0	---
	A2	5-14	7.0-7.8	10-15	---	40-60	100	0	---
	AC	14-46	7.8-8.3	0-2	---	40-45	100	0	---
	C	46-200	8.0-8.6	0-2	---	40-45	100	0	---

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Horizon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extractable aluminum	Aluminum saturation
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
629:									
Majuro----------	Oi	0-2	7.0-7.2	80-90	---	80-90	100	0	---
	A1	2-5	7.4-7.8	20-30	---	60-70	100	0	---
	A2	5-14	7.4-7.8	10-15	---	40-60	100	0	---
	AC	14-33	7.8-8.3	0-2	---	40-45	100	0	---
	C	33-200	8.0-8.6	0-2	---	40-45	100	0	---
630:									
Ngersuul--------	Oi	0-4	5.6-6.0	136-161	102-121	136-161	100	0.1-0.7	0-1
	A	4-10	4.5-5.5	25-30	15-20	10-15	40-50	2-3	13-15
	Bw	10-51	4.5-6.0	25-30	10-15	10-15	40-50	1-2	10-15
	2Cg	51-200	4.5-6.0	25-36	11-18	4-15	15-42	2-5	18-28
631:									
Odesangel-------	Oi	0-10	6.3-7.3	140-160	70-80	220-250	100	0	0
	Oe	10-28	6.3-7.3	140-160	70-80	220-250	100	0	0
	Oa	28-45	3.0-5.0	140-160	70-80	220-250	100	0	0
	2C	45-200	8.0-8.6	0-2	---	40-45	100	0	---
632:									
Nekken----------	Oi	0-5	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	5-22	4.9-5.9	40-50	15-20	15-25	38-50	0.5-1	3-5
	BCt	22-61	5.1-5.4	35-45	15-20	5-10	14-22	0.2-0.6	1-3
	R	61-86	---	---	---	---	---	---	---
Ollei------------	Oi	0-6	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	6-17	4.9-5.6	35-45	15-25	15-25	43-56	0.5-2	3-6
	AB	17-28	4.8-5.3	20-30	10-20	7-15	35-50	2-5	22-27
	Bw	28-41	4.9-5.6	20-30	10-20	7-15	35-50	2-5	22-27
	R	41-66	---	---	---	---	---	---	---
633:									
Nekken----------	Oi	0-3	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	3-16	4.9-5.9	40-50	15-20	15-25	38-50	0.5-1	3-5
	Bt	16-27	5.2-5.6	35-40	11-15	6-12	19-30	4-9	42-63
	C	27-62	5.1-5.4	30-35	8-10	4-7	13-20	4-8	56-80
	R	62-87	---	---	---	---	---	---	---
Ollei-----------	Oi	0-2	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	2-7	4.9-5.6	35-45	15-25	15-25	43-56	0.5-2	3-6
	AB	7-32	4.8-5.3	20-30	10-20	7-15	35-50	2-5	22-27
	R	32-57	---	---	---	---	---	---	---
634:									
Rock outcrop.									
Ollei-----------	Oe	0-5	5.2-5.9	80-115	85-95	80-115	100	0.1-0.3	0
	A	5-10	4.9-5.6	35-45	15-25	15-25	43-56	0.5-2	3-6
	Bw	10-20	4.9-5.6	20-30	10-20	7-15	35-50	2-5	22-27
	R	20-45	---	---	---	---	---	---	---
635:									
Palau-----------	A	0-19	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo1	19-31	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	Bo2	31-52	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	52-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
636:									
Palau-----------	A	0-10	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	BA	10-28	3.6-5.0	20-25	5-10	1-5	5-20	2-6	40-65
	Bo1	28-56	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	Bo2	56-107	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	BC	107-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Horizon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extractable aluminum	Aluminum saturation
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
637:									
Palau-----------	A	0-10	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo1	10-29	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	Bo2	29-106	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	106-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
638:									
Palau-----------	Ap	0-4	4.8-5.1	20-25	6-9	1-2	6-8	3-6	50-67
	Bo	4-150	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	150-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
639:									
Palau-----------	A	0-19	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo1	19-31	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	Bo2	31-52	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	52-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
640:									
Palau, bedded tuff substratum	A	0-13	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo	13-51	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	51-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
641:									
Palau, bedded tuff substratum	A	0-15	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo	15-82	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	82-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
642:									
Palau, bedded tuff substratum	A	0-5	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo	5-81	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	81-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
643:									
Palau, bedded tuff substratum	A	0-13	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	AB	13-24	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo	24-135	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	CB	135-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
644:									
Palau, bedded tuff substratum	A	0-6	4.8-5.1	24-26	8-10	2-6	10-25	3-6	35-58
	Bo	6-58	5.1-5.6	14-16	4-7	0.9-2	6-11	3-6	70-87
	C	58-200	5.2-5.8	12-16	5-7	0.2-0.5	2-3	4-6	88-93
645:									
Peleliu---------	Oi	0-1	5.4-5.8	125-150	120-149	120-149	96-99	0	0
	A	1-13	7.2-8.0	75-110	---	120-140	100	0	---
	Bw	13-30	7.8-8.2	50-65	---	85-100	100	0	---
	R	30-55	8.8-9.2	---	---	---	---	---	---
646:									
Peleliu---------	Oi	0-5	5.4-5.8	125-150	120-149	120-149	96-99	0	0
	A	5-20	7.2-8.0	75-110	---	120-140	100	0	---
	Bw	20-40	7.8-8.2	50-65	---	85-100	100	0	---
	R	40-65	8.5-9.0	---	---	---	---	---	---
Chelbacheb------	Oa	0-20	5.4-5.8	125-150	120-149	120-149	96-99	0	0
	2R	20-40	8.8-9.2	---	---	---	---	---	---

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Horizon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extractable aluminum	Aluminum saturation
		cm	1:1 H_2O	meq/100g	meq/100g	meq/100g	pct	meq/100g	pct
647: Rock outcrop.									
Peleliu	Oe	0-5	5.4-5.8	125-150	120-149	120-149	96-99	0	0
	A	5-15	7.2-8.0	75-110	---	120-140	100	0	---
	Bw	15-27	7.8-8.2	50-65	---	85-100	100	0	---
	R	27-52	8.5-9.0	---	---	---	---	---	---
Chelbacheb	Oa	0-20	5.4-5.8	125-150	120-149	120-149	96-99	0	0
	2R	20-40	8.8-9.4	---	---	---	---	---	---
648: Tabecheding	A	0-10	3.6-5.0	10-20	2-5	0.1-0.6	1-3	2-4	80-88
	Bto	10-73	3.6-4.4	10-15	5-6	0.1-0.3	1-2	4-6	80-95
	CBt	73-83	3.6-4.4	25-35	15-25	11-19	44-54	4-6	23-24
	C	83-100	3.6-4.4	25-35	15-25	11-19	44-54	4-6	23-24
	2Cg	100-200	2.3-3.4	40-50	30-45	32-45	80-90	0.3-2	1-4
649: Tabecheding	A	0-10	3.6-5.0	10-20	2-5	0.1-0.6	1-3	2-4	80-88
	Bto	10-50	3.6-4.4	10-15	5-6	0.1-0.3	1-2	4-6	80-95
	CBt	50-60	3.6-4.4	25-35	15-25	11-19	44-54	4-6	23-24
	C	60-90	3.6-4.4	25-35	15-25	11-19	44-54	4-6	23-24
	2Cg	90-200	2.3-3.4	40-50	30-45	32-45	80-90	0.3-2	1-4
650: Aquic Dystrudepts	A	0-10	3.6-5.0	10-20	2-5	0.1-0.6	1-3	2-4	80-88
	CBg	10-200	3.6-5.0	40-50	30-45	32-45	80-90	0.3-2	1-4
651: Tabecheding	A	0-18	3.6-5.0	10-20	2-5	0.1-0.6	1-3	2-4	80-88
	Bto	18-51	3.6-4.4	10-15	5-6	0.1-0.3	1-2	4-6	80-95
	CBt	51-86	3.6-4.4	25-35	15-25	11-19	44-54	4-6	23-24
	C	86-104	3.6-4.4	25-35	15-25	11-19	44-54	4-6	23-24
	2Cg	104-200	2.3-3.4	40-50	30-45	32-45	80-90	0.3-2	1-4
652: Aquic Dystrudepts	A	0-10	3.6-5.0	10-20	2-5	0.1-0.6	1-3	2-4	80-88
	BC	10-65	3.6-5.0	40-50	30-45	32-45	80-90	0.3-2	1-4
	Cg	65-200	3.6-5.0	40-50	30-45	32-45	80-90	0.3-2	1-4
653: Typic Udorthents, 30 to 75 percent slopes	Ac	0-4	4.9-5.5	12-16	5-7	0.2-0.5	2-3	4-6	80-90
	C	4-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
Typic Udorthents, 0 to 6 percent slopes	Ac	0-2	4.9-5.5	12-16	4-7	0.2-0.5	2-3	3-6	85-90
	AC	2-12	4.9-5.5	12-16	3-7	0.2-0.5	2-3	3-6	87-93
	C	12-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93
654: Urban land.									
Typic Udorthents	Ac	0-1	4.9-5.5	12-16	4-7	0.2-0.5	2-3	3-6	85-90
	C1	1-29	5.1-5.5	12-16	3-7	0.2-0.5	2-3	3-6	87-93
	C2	29-200	5.1-5.5	12-16	5-7	0.2-0.5	2-3	4-6	88-93

Table 15.--Chemical Soil Properties--Continued

Map symbol and soil name	Horizon	Depth	Soil reaction	CEC (pH 7)	ECEC	Sum of bases	Base saturation	Extractable aluminum	Aluminum saturation
		cm	*1:1 H_2O*	*meq/100g*	*meq/100g*	*meq/100g*	*pct*	*meq/100g*	*pct*
655:									
Quarry.									
656:									
Water, brackish.									
657:									
Water, fresh.									
659:									
Ollei, lower fertility------	A	0-8	4.9-5.6	27-35	12-19	10-15	37-43	2-4	17-21
	Bw	8-14	4.9-5.6	21-31	10-18	6-10	29-32	4-8	40-44
	CB	14-21	5.1-5.5	19-25	9-16	4-6	21-24	5-10	56-62
	R	21-46	---	---	---	---	---	---	---
Nekken, lower fertility------	A	0-16	4.9-5.9	35-45	12-17	12-16	33-36	0.5-1	4-6
	Bt	16-62	5.2-5.6	25-30	9-13	5-6	18-20	4-7	52-54
	R	62-87	---	---	---	---	---	---	---
660:									
Ollei, lower fertility------	A	0-18	4.9-5.6	27-35	12-19	10-15	37-43	2-4	17-21
	Bw	18-28	4.9-5.6	21-31	10-18	6-10	29-32	4-8	40-44
	C	28-43	4.9-5.6	19-25	9-16	4-6	21-24	5-10	56-62
	R	43-68	---	---	---	---	---	---	---
Rock outcrop.									
661:									
Nekken, lower fertility------	A	0-16	4.9-5.9	35-45	12-17	12-16	33-36	0.5-1	4-6
	Bt	16-27	5.2-5.6	25-30	9-13	5-6	18-20	4-7	52-54
	C	27-62	5.1-5.4	30-35	8-10	4-7	13-20	4-8	56-80
	R	62-87	---	---	---	---	---	---	---
Ollei, lower fertility------	A	0-7	4.9-5.6	27-35	12-19	10-15	37-43	2-4	17-21
	AB	7-32	4.8-5.3	21-31	10-18	6-10	29-32	4-8	40-44
	R	32-57	---	---	---	---	---	---	---

Table 16.--Erosion Properties of the Soils

[Entries under "Erosion factors" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer]

Map symbol and soil name	Depth	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	cm					
600:						
Aimeliik	0-3	.05	.05	1	5	56
	3-7	.15	.17			
	7-18	.17	.17			
	18-82	.17	.17			
	82-93	.17	.17			
	93-200	.17	.17			
601:						
Aimeliik	0-3	.05	.05	1	5	56
	3-12	.15	.17			
	12-86	.17	.17			
	86-200	.17	.17			
602:						
Aimeliik	0-3	.05	.05	1	5	56
	3-12	.15	.17			
	12-26	.17	.17			
	26-52	.17	.17			
	52-200	.17	.17			
603:						
Aimeliik	0-7	.05	.05	1	5	56
	7-12	.15	.17			
	12-96	.17	.17			
	96-200	.17	.17			
604:						
Aimeliik	0-4	.05	.05	1	5	56
	4-8	.15	.17			
	8-86	.17	.17			
	86-200	.17	.17			
605:						
Aimeliik, bedded tuff substratum	0-4	.05	.05	1	5	56
	4-18	.15	.17			
	18-64	.17	.17			
	64-200	.17	.17			
606:						
Aimeliik, bedded tuff substratum	0-4	.05	.05	1	5	56
	4-8	.15	.17			
	8-103	.17	.17			
	103-200	.20	.20			
607:						
Aimeliik, bedded tuff substratum	0-3	.05	.05	1	5	56
	3-18	.15	.17			
	18-124	.17	.17			
	124-200	.20	.20			
608:						
Aimeliik, bedded tuff substratum	0-3	.05	.05	1	5	56
	3-11	.15	.17			
	11-62	.17	.17			
	62-200	.20	.20			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
	cm					
609:						
Aimeliik, bedded tuff substratum-------	0-5	.05	.05	1	5	56
	5-21	.15	.17			
	21-89	.17	.17			
	89-200	.20	.20			
610:						
Aimeliik-------------------------------	0-7	.05	.05	1	5	56
	7-27	.15	.17			
	27-125	.17	.17			
	125-200	.20	.20			
Ollei----------------------------------	0-5	.05	.05	1	8	0
	5-15	.10	.17			
	15-33	.10	.17			
	33-58	.02	.02			
611:						
Aimeliik-------------------------------	0-4	.05	.05	1	5	56
	4-13	.15	.17			
	13-71	.17	.17			
	71-200	.17	.17			
Ollei----------------------------------	0-4	.05	.05	1	8	0
	4-18	.10	.17			
	18-38	.10	.17			
	38-63	.02	.02			
612:						
Babelthuap-----------------------------	0-7	.05	.17	1	7	38
	7-24	.17	.17			
	24-61	.17	.17			
	61-200	.17	.17			
Ngardmau-------------------------------	0-4	.05	.17	1	6	48
	4-29	.10	.24			
	29-200	.17	.24			
Typic Udorthents-----------------------	0-1	.05	.17	1	8	0
	1-3	.17	.17			
	3-200	.17	.17			
613:						
Babelthuap-----------------------------	0-12	.05	.17	1	7	38
	12-85	.17	.17			
	85-200	.17	.17			
Ngardmau-------------------------------	0-4	.05	.17	1	6	48
	4-45	.10	.24			
	45-200	.17	.24			
Typic Udorthents-----------------------	0-1	.05	.17	1	8	0
	1-3	.17	.17			
	3-200	.17	.17			
614:						
Babelthuap-----------------------------	0-2	.05	.17	1	7	38
	2-92	.17	.17			
	92-200	.17	.17			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	cm					
614:						
Ngardmau	0-4	.05	.17	1	6	48
	4-29	.17	.17			
	29-200	.17	.17			
Typic Udorthents	0-1	.05	.17	1	8	0
	1-3	.17	.24			
	3-200	.17	.24			
615:						
Chia	0-51	.05	.05	1	8	0
	51-74	.05	.05			
	74-94	.10	.10			
	94-200	.10	.10			
Insak	0-8	.05	.05	2	8	0
	8-18	.05	.05			
	18-46	.10	.10			
	46-74	.10	.10			
	74-99	.02	.02			
616:						
Dechel	0-6	.15	.15	5	8	0
	6-18	.15	.15			
	18-200	.15	.15			
617:						
Ilachetomel	0-41	.05	.05	1	8	0
	41-200	.05	.05			
Naniak	0-30	.15	.20	5	8	0
	30-61	.15	.20			
	61-200	.15	.20			
618:						
Mesei	0-21	.05	.05	2	8	0
	21-77	.05	.05			
	77-200	.15	.15			
Dechel	0-7	.15	.15	5	8	0
	7-20	.15	.15			
	20-200	.15	.15			
619:						
Nekken	0-3	.05	.05	2	5	56
	3-20	.10	.20			
	20-46	.10	.20			
	46-56	.10	.20			
	56-81	.02	.02			
Ollei	0-4	.05	.05	1	8	0
	4-8	.05	.17			
	8-14	.05	.17			
	14-21	.05	.17			
	21-46	.02	.02			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	cm					
620:						
Ngardmau	0-4	.05	.17	1	6	48
	4-12	.17	.17			
	12-43	.17	.17			
	43-200	.17	.17			
Babelthuap	0-4	.05	.17	1	7	38
	4-20	.17	.17			
	20-39	.17	.17			
	39-200	.17	.17			
Typic Udorthents	0-1	.05	.17	1	8	0
	1-3	.17	.17			
	3-200	.17	.17			
621:						
Ngardmau	0-4	.05	.17	1	6	48
	4-12	.17	.17			
	12-43	.17	.17			
	43-200	.17	.17			
Babelthuap	0-6	.05	.17	1	7	38
	6-58	.17	.17			
	58-200	.17	.17			
Typic Udorthents	0-1	.05	.17	1	8	0
	1-3	.17	.17			
	3-200	.17	.17			
622:						
Oxic Dystrudepts	0-5	.10	.17	1	5	56
	5-15	.10	.17			
	15-200	.10	.17			
623:						
Oxic Dystrudepts	0-2	.10	.17	1	6	48
	2-13	.10	.17			
	13-43	.10	.17			
	43-200	.10	.17			
624:						
Ngatpang	0-15	.10	.17	1	6	48
	15-48	.10	.17			
	48-114	.10	.17			
	114-200	.10	.17			
625:						
Ngatpang	0-6	.10	.17	1	6	48
	6-12	.10	.17			
	12-91	.10	.17			
	91-200	.10	.17			
626:						
Ngatpang	0-13	.10	.17	1	6	48
	13-40	.10	.17			
	40-126	.10	.17			
	126-200	.10	.17			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	cm					
627:						
Ngatpang	0-10	.10	.17	1	6	48
	10-85	.10	.17			
	85-120	.10	.17			
	120-200	.10	.17			
628:						
Ngedebus	0-1	.05	.05	1	3	86
	1-5	.10	.10			
	5-14	.10	.10			
	14-46	.10	.10			
	46-200	.10	.10			
629:						
Majuro	0-2	.05	.05	1	8	0
	2-5	.10	.10			
	5-14	.10	.10			
	14-33	.10	.10			
	33-200	.10	.10			
630:						
Ngersuul	0-4	.05	.05	5	5	56
	4-10	.15	.15			
	10-51	.15	.15			
	51-200	.15	.15			
631:						
Odesangel	0-10	.05	.05	2	8	0
	10-28	.05	.05			
	28-45	.05	.05			
	45-200	.10	.10			
632:						
Ollei	0-6	.05	.05	1	8	0
	6-17	.05	.17			
	17-28	.05	.17			
	28-41	.05	.17			
	41-66	.02	.02			
Nekken	0-5	.05	.05	2	5	56
	5-22	.10	.20			
	22-61	.10	.20			
	61-86	.02	.02			
633:						
Ollei	0-2	.05	.05	1	8	0
	2-7	.05	.17			
	7-32	.05	.17			
	32-57	.02	.02			
Nekken	0-3	.05	.05	2	5	56
	3-16	.10	.20			
	16-27	.10	.20			
	27-62	.10	.20			
	62-87	.02	.02			
634:						
Ollei	0-5	.05	.05	1	8	0
	5-10	.05	.17			
	10-20	.05	.17			
	20-45	.02	.02			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	cm					
634:						
Rock outcrop	0-200	.02	.02	---	8	0
635:						
Palau	0-19	.17	.17	1	5	48
	19-31	.17	.17			
	31-52	.17	.17			
	52-200	.17	.17			
636:						
Palau	0-10	.17	.17	1	5	48
	10-28	.17	.17			
	28-56	.17	.17			
	56-107	.17	.17			
	107-200	.17	.17			
637:						
Palau	0-10	.17	.17	1	5	48
	10-29	.17	.17			
	29-106	.17	.17			
	106-200	.17	.17			
638:						
Palau	0-4	.17	.17	1	5	48
	4-150	.17	.17			
	150-200	.17	.17			
639:						
Palau	0-19	.17	.17	1	5	48
	19-31	.17	.17			
	31-52	.17	.17			
	52-200	.17	.17			
640:						
Palau, bedded tuff substratum	0-13	.17	.17	1	5	48
	13-51	.17	.17			
	51-200	.17	.17			
641:						
Palau, bedded tuff substratum	0-15	.17	.17	1	5	48
	15-82	.17	.17			
	82-200	.17	.17			
642:						
Palau, bedded tuff substratum	0-5	.17	.17	1	5	48
	5-81	.17	.17			
	81-200	.17	.17			
643:						
Palau, bedded tuff substratum	0-13	.17	.17	1	5	48
	13-24	.17	.17			
	24-135	.17	.17			
	135-200	.17	.17			
644:						
Palau, bedded tuff substratum	0-6	.17	.17	1	5	48
	6-58	.17	.17			
	58-200	.17	.17			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
	cm					
645:						
Peleliu	0-1	.05	.05	1	8	0
	1-13	.05	.17			
	13-30	.05	.17			
	30-55	.02	.02			
646:						
Peleliu	0-5	.05	.05	1	8	0
	5-20	.05	.17			
	20-40	.05	.17			
	40-65	.02	.02			
Chelbacheb	0-20	.05	.05	1	8	0
	20-40	.02	.02			
647:						
Peleliu	0-5	.05	.05	1	8	0
	5-15	.05	.17			
	15-27	.05	.17			
	27-52	.02	.02			
Chelbacheb	0-20	.05	.05	1	8	0
	20-40	.02	.02			
Rock outcrop	0-200	.02	.02	---	8	0
648:						
Tabecheding	0-10	.17	.20	1	6	48
	10-73	.17	.20			
	73-83	.17	.20			
	83-100	.17	.20			
	100-200	.17	.20			
649:						
Tabecheding	0-10	.17	.20	1	6	48
	10-50	.17	.20			
	50-60	.17	.20			
	60-90	.17	.20			
	90-200	.17	.20			
650:						
Aquic Dystrudepts	0-10	.17	.20	1	7	38
	10-200	.17	.20			
651:						
Tabecheding	0-18	.17	.20	1	6	48
	18-51	.17	.20			
	51-86	.17	.20			
	86-104	.17	.20			
	104-200	.17	.20			
652:						
Aquic Dystrudepts	0-10	.17	.20	1	7	38
	10-65	.17	.20			
	65-200	.17	.20			
653:						
Typic Udorthents, 30 to 75 percent slopes	0-2	.05	.17	1	8	0
	2-12	.17	.17			
	12-200	.17	.17			

Table 16.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	cm					
653:						
Typic Udorthents, 0 to 6 percent slopes	0-4	.05	.17	1	8	0
	4-200	.17	.17			
654:						
Typic Udorthents	0-1	.05	.17	1	8	0
	1-29	.17	.17			
	29-200	.17	.17			
Urban land	0-200	---	---	1	8	0
655:						
Quarry	---	---	---	1	8	0
656:						
Water, brackish.						
657:						
Water, fresh.						
659:						
Nekken, lower fertility	0-16	.10	.20	2	5	56
	16-62	.10	.20			
	62-87	.02	.02			
Ollei, lower fertility	0-8	.05	.17	1	8	0
	8-14	.05	.17			
	14-21	.05	.17			
	21-46	.02	.02			
660:						
Ollei, lower fertility	0-18	.05	.17	1	8	0
	18-28	.05	.17			
	28-43	.05	.17			
	43-68	.02	.02			
Rock outcrop	0-200	.02	.02	---	8	0
661:						
Ollei, lower fertility	0-7	.05	.17	1	8	0
	7-32	.05	.17			
	32-57	.02	.02			
Nekken, lower fertility	0-16	.10	.20	2	5	56
	16-27	.10	.20			
	27-62	.10	.20			
	62-87	.02	.02			

Table 17.--Pedons Sampled for Laboratory Analyses at the NSSL

Sampled as	User pedon ID	Approved name	Map unit symbol
Aimeliik	79TQ632003	Aimeliik	602
Aimeliik	S03PW-002-002	Aimeliik	602
Aimeliik	S03PW-002-007	Aimeliik	603
Aimeliik	S05PW-212-001	Aimeliik	603
Aimeliik	S05PW-222-001	Aimeliik	604
Aimeliik	S06PW-002-001	Aimeliik	604
Aimeliik	S05PW-227-001	Aimeliik	620
Babelthuap	79TQ632002A	Babelthuap	613
Babelthuap	79TQ632002B	Babelthuap	613
Babelthuap	79TQ632002C	Babelthuap	613
Babelthuap	79TQ632002	Babelthuap	613
Babelthuap	S03PW-002-001A	Babelthuap	614
Babelthuap	S03PW-002-001B	Babelthuap	614
Babelthuap	S03PW-002-001C	Babelthuap	614
Babelthuap	S03PW-002-001D	Babelthuap	614
Babelthuap	S03PW-002-001E	Babelthuap	614
Babelthuap	S03PW-002-001F	Babelthuap	614
Babelthuap	S03PW-002-001G	Babelthuap	614
Chelbacheb	S03PW-150-001	Chelbacheb	647
Dechel	79TQ632010	Dechel	616
Dechel	S03PW-004-001	Dechel	616
Mesei	80TQ632005	Mesei	616
Nekken	79TQ632005	Nekken	619
Ngardmau	S03PW-002-004	Ngardmau	613
Ngardmau	S03PW-002-005	Babelthuap	613
Ngardmau	S03PW-002-003	Ngardmau	614
Ngardok	S05PW-212-002	Aimeliik, bedded tuff	608
Ngardok	S03PW-227-001	Nekken	619
Ngardok	79TQ632011	Ngardok	642
Ngatpang	79TQ632006	Ngatpang	624
Ngatpang	S03PW-002-006	Ngatpang	624
Ngedebus	S06PW-150-001	Ngedebus	628
Ngersuul	80TQ632006	Ngersuul	630
Ngerungor variant	80TQ633002	Odesangel	631
Ollei	S06PW-002-002	Ollei	611
Palau	79TQ632001	Palau	636
Palau	S06PW212-001	Palau	638
Palau, wet	S03PW-004-002	Oxyaquic Dystrudepts	636
Peleliu	79TQ633001	Peleliu	645
Peleliu	S06PW-150-002	Peleliu	647
SND	S03PW-004-003	SND	
SND	S03PW-150-002	SND	
Tabecheding	79TQ632004	Tabecheding	648

Table 18.--Water Features

[Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months]

Map symbol and soil name	Hydro- logic group	Surface runoff	Months	Water table: Upper limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				cm		*cm*				
600:										
Aimeliik--------	B	Very low	Jan-Dec	>181	---	---	---	None	---	None
601:										
Aimeliik--------	B	Low	Jan-Dec	>181	---	---	---	None	---	None
602:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
603:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
604:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
605:										
Aimeliik--------	B	Very low	Jan-Dec	>181	---	---	---	None	---	None
606:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
607:										
Aimeliik--------	B	High	Jan-Dec	>181	---	---	---	None	---	None
608:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
609:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
610:										
Aimeliik--------	B	High	Jan-Dec	>181	---	---	---	None	---	None
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
611:										
Aimeliik--------	B	Medium	Jan-Dec	>181	---	---	---	None	---	None
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				cm		*cm*				
612:										
Babelthuap------	C	Low	Jan-Dec	>181	---	---	---	None	---	None
Ngardmau--------	C	Low	Jan-Dec	>181	---	---	---	None	---	None
Typic Udorthents	C	Low	Jan-Dec	>181	---	---	---	None	---	None
613:										
Babelthuap------	C	Medium	Jan-Dec	>181	---	---	---	None	---	None
Ngardmau--------	C	Medium	Jan-Dec	>181	---	---	---	None	---	None
Typic Udorthents	C	Medium	Jan-Dec	>181	---	---	---	None	---	None
614:										
Babelthuap------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Ngardmau--------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Typic Udorthents	C	High	Jan-Dec	>181	---	---	---	None	---	None
615:										
Chia------------	D	High	Jan-Dec	0-15	Apparent	---	---	None	Extremely brief	Very frequent
Insak-----------	A/D	High	Jan-Dec	0	Apparent	---	---	None	Extremely brief	Very frequent
616:										
Dechel----------	C/D	Negligible	Jan-Dec	0-25	Apparent	0-15	Long	Frequent	Extremely brief	Frequent
617:										
Ilachetomel-----	D	High	Jan-Dec	0-15	Apparent	---	---	None	Extremely brief	Very frequent
Naniak----------	B/D	Negligible	Jan-Dec	0-20	Apparent	0-30	Very long	Frequent	Extremely brief	Very frequent

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
				cm		*cm*				
618:										
Mesei----------	D	Negligible	Jan-Dec	0-15	Apparent	0-30	Very long	Frequent	Extremely brief	Frequent
Dechel---------	C/D	Negligible	Jan-Dec	0-25	Apparent	0-15	Long	Frequent	Extremely brief	Frequent
619:										
Nekken---------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Ollei----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
620:										
Ngardmau--------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Babelthuap------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Typic Udorthents	C	High	Jan-Dec	>181	---	---	---	None	---	None
621:										
Ngardmau--------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Babelthuap------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Typic Udorthents	C	High	Jan-Dec	>181	---	---	---	None	---	None
622:										
Oxic Dystrudepts	D	Very high	Jan-Dec	35-45	Apparent	---	---	None	---	None
623:										
Oxic Dystrudepts	D	Very high	Jan-Dec	35-45	Apparent	---	---	None	---	None
624:										
Ngatpang--------	C/D	Very high	Jan-Dec	40-50	Apparent	---	---	None	---	None
625:										
Ngatpang--------	C/D	Very high	Jan-Dec	40-50	Apparent	---	---	None	---	None
626:										
Ngatpang--------	C/D	Very high	Jan-Dec	40-50	Apparent	---	---	None	---	None
627:										
Ngatpang--------	C/D	Very high	Jan-Dec	40-50	Apparent	---	---	None	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
				cm		*cm*				
628:										
Ngedebus--------	A	Negligible	Jan-Dec	100-150	Apparent	---	---	None	Very brief	Occasional
629:										
Majuro----------	A	Negligible	Jan-Dec	>107	Apparent	---	---	None	Very brief	Occasional
630:										
Ngersuul--------	C	Negligible	Jan-Dec	61-91	Apparent	---	---	None	Very brief	Frequent
631:										
Odesangel-------	A/D	Very low	Jan-Dec	0	Apparent	0-15	Very long	Frequent	Extremely brief	Frequent
632:										
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
Nekken----------	C	High	Jan-Dec	>181	---	---	---	None	---	None
633:										
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
Nekken----------	C	High	Jan-Dec	>181	---	---	---	None	---	None
634:										
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
Rock outcrop----	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
635:										
Palau-----------	C	Low	Jan-Dec	>150	---	---	---	None	---	None
636:										
Palau-----------	C	Medium	Jan-Dec	>150	---	---	---	None	---	None
637:										
Palau-----------	C	High	Jan-Dec	>150	---	---	---	None	---	None
638:										
Palau-----------	C	High	Jan-Dec	>150	---	---	---	None	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
				cm		*cm*				
639:										
Palau-----------	C	High	Jan-Dec	>150	---	---	---	None	---	None
640:										
Palau-----------	C	Low	Jan-Dec	>150	---	---	---	None	---	None
641:										
Palau-----------	C	Medium	Jan-Dec	>150	---	---	---	None	---	None
642:										
Palau-----------	C	High	Jan-Dec	>150	---	---	---	None	---	None
643:										
Palau-----------	C	High	Jan-Dec	>150	---	---	---	None	---	None
644:										
Palau-----------	C	High	Jan-Dec	>150	---	---	---	None	---	None
645:										
Peleliu---------	B	Very low	Jan-Dec	>50	---	---	---	None	---	None
646:										
Peleliu---------	B	Low	Jan-Dec	>50	---	---	---	None	---	None
Chelbacheb------	B	Low	Jan-Dec	>40	---	---	---	None	---	None
647:										
Peleliu---------	B	Medium	Jan-Dec	>50	---	---	---	None	---	None
Chelbacheb------	B	Medium	Jan-Dec	>40	---	---	---	None	---	None
Rock outcrop----	D	Medium	Jan-Dec	>181	---	---	---	None	---	None
648:										
Tabecheding-----	D	Negligible	Jan-Apr	35-50	Perched	3-11	Very brief	Occasional	---	None
		Negligible	May-Dec	35-50	Perched	3-11	Brief	Occasional	---	None
649:										
Tabecheding-----	D	Negligible	Jan-Apr	35-50	Perched	3-11	Very brief	Occasional	---	None
		Negligible	May-Dec	35-50	Perched	3-11	Brief	Occasional	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				cm		*cm*				
650:										
Aquic Dystrudepts----	C/D	High	Jan-Apr	25-40	Perched	3-11	Very brief	Occasional	---	None
		High	May-Dec	25-40	Perched	3-11	Brief	Occasional	---	None
651:										
Tabecheding-----	D	Negligible	Jan-Apr	35-50	Perched	3-11	Very brief	Occasional	---	None
		Negligible	May-Dec	35-50	Perched	3-11	Brief	Occasional	---	None
652:										
Aquic Dystrudepts----	C/D	Negligible	Jan-Apr	25-40	Perched	3-11	Very brief	Occasional	---	None
		Negligible	May-Dec	25-40	Perched	3-11	Brief	Occasional	---	None
653:										
Typic Udorthents	C	Low	Jan----	---	---	---	---	None	---	None
654:										
Typic Udorthents	C	Medium	Jan-Dec	>181	---	---	---	None	---	None
Urban land------	D	High	Jan-Dec	>181	---	---	---	None	---	None
655:										
Quarry.										
656:										
Water, brackish.										
657:										
Water, fresh.										
659:										
Nekken----------	C	High	Jan-Dec	>181	---	---	---	None	---	None
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
660:										
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
Rock outcrop----	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
661:										
Ollei-----------	D	Very high	Jan-Dec	>181	---	---	---	None	---	None
Nekken----------	C	High	Jan-Dec	>181	---	---	---	None	---	None

Table 19.--Soil Features

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Hazard of soil slippage	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		cm	*cm*		*cm*	*cm*			
600: Aimeliik	Abrupt textural change	5-25	---	Noncemented	0	0	High	High	Moderate
601: Aimeliik	Abrupt textural change	10-40	---	Noncemented	0	0	High	High	Moderate
602: Aimeliik	Abrupt textural change	10-30	---	Noncemented	0	0	High	High	Moderate
603: Aimeliik	Abrupt textural change	10-25	---	Noncemented	0	0	High	High	Moderate
604: Aimeliik	Abrupt textural change	5-25	---	Noncemented	0	0	High	High	Moderate
605: Aimeliik, bedded tuff substratum	Abrupt textural change	10-25	---	Noncemented	0	0	High	High	Moderate
606: Aimeliik, bedded tuff substratum	Abrupt textural change	5-25	---	Noncemented	0	0	High	High	Moderate
607: Aimeliik, bedded tuff substratum	Abrupt textural change	10-25	---	Noncemented	0	0	High	High	Moderate
608: Aimeliik, bedded tuff substratum	Abrupt textural change	10-25	---	Noncemented	0	0	High	High	Moderate
609: Aimeliik, bedded tuff substratum	Abrupt textural change	10-25	---	Noncemented	0	0	High	High	Moderate

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Hazard of soil slippage	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		cm	*cm*		*cm*	*cm*			
610:									
Aimeliik	Abrupt textural change	10-30	---	Noncemented	0	0	High	High	Moderate
Ollei	Lithic bedrock	15-50	---	Indurated	0	0	High	High	Moderate
611:									
Aimeliik	Abrupt textural change	10-25	---	Noncemented	0	0	High	High	Moderate
Ollei	Lithic bedrock	10-50	---	Indurated	0	0	High	High	Moderate
612:									
Babelthuap	Abrupt textural change	3-10	---	Noncemented	0	0	High	High	Moderate
Ngardmau	---	---	---	---	0	0	High	High	Moderate
Typic Udorthents	---	---	---	---	0	0	High	High	Moderate
613:									
Babelthuap	Abrupt textural change	3-15	---	Noncemented	0	0	High	High	Moderate
Ngardmau	---	---	---	---	0	0	High	High	Moderate
Typic Udorthents	---	---	---	---	0	0	High	High	Moderate
614:									
Babelthuap	Abrupt textural change	2-10	---	Noncemented	0	0	High	High	Moderate
Ngardmau	---	---	---	---	0	0	High	High	Moderate
Typic Udorthents	---	---	---	---	0	0	High	High	Moderate
615:									
Chia	---	---	---	---	25-75	50-150	Low	High	Low
Insak	Lithic bedrock	50-100	---	Indurated	0-10	0-20	Low	High	Low
616:									
Dechel	---	---	---	---	0-5	5-20	Low	Moderate	Moderate

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Hazard of soil slippage	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		cm	*cm*		*cm*	*cm*			
617:									
Ilachetomel-------	---	---	---	---	39	200	Low	High	High
Naniak------------	---	---	---	---	0-10	0-20	Low	High	High
618:									
Mesei-------------	---	---	---	---	25-75	50-150	Low	High	High
Dechel------------	---	---	---	---	0-5	5-15	Low	High	Moderate
619:									
Nekken------------	Lithic bedrock	50-100	---	Indurated	0	0	High	High	Moderate
Ollei-------------	Lithic bedrock	15-50	---	Indurated	0	0	High	High	Moderate
620:									
Ngardmau----------	---	---	---	---	0	0	High	High	Moderate
Babelthuap--------	Abrupt textural change	4-10	---	Noncemented	0	0	High	High	Moderate
Typic Udorthents--	---	---	---	---	0	0	High	High	Moderate
621:									
Ngardmau----------	---	---	---	---	0	0	High	High	Moderate
Babelthuap--------	Abrupt textural change	5-10	---	Noncemented	0	0	High	High	Moderate
Typic Udorthents--	---	---	---	---	0	0	High	High	Moderate
622:									
Oxic Dystrudepts--	---	---	---	---	0	0	High	High	Moderate
623:									
Oxic Dystrudepts--	---	---	---	---	0	0	High	High	Moderate
624:									
Ngatpang----------	---	---	---	---	0	0	High	High	Moderate
625:									
Ngatpang----------	---	---	---	---	0	0	High	High	Moderate
626:									
Ngatpang----------	---	---	---	---	0	0	High	High	Moderate

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Hazard of soil slippage	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		cm	*cm*		*cm*	*cm*			
627:									
Ngatpang	---	---	---	---	0	0	High	High	Moderate
628:									
Ngedebus	---	---	---	---	0	0	Low	Moderate	Low
629:									
Majuro	---	---	---	---	0	0	Low	Moderate	Low
630:									
Ngersuul	---	---	---	---	0	0	Low	High	Moderate
631:									
Odesangel	---	---	---	---	25-35	40-75	Low	High	Low
632:									
Ollei	Lithic bedrock	25-50	---	Indurated	0	0	High	High	Moderate
Nekken	Lithic bedrock	50-100	---	Indurated	0	0	High	High	Moderate
633:									
Ollei	Lithic bedrock	25-50	---	Indurated	0	0	High	High	Moderate
Nekken	Lithic bedrock	50-100	---	Indurated	0	0	High	High	Moderate
634:									
Ollei	Lithic bedrock	15-50	---	Indurated	0	0	High	High	Moderate
Rock outcrop	Lithic bedrock	0	---	Indurated	0	0	---	---	---
635:									
Palau	---	---	---	---	0	0	Medium	High	High
636:									
Palau	---	---	---	---	0	0	Medium	High	High
637:									
Palau	---	---	---	---	0	0	Medium	High	High
638:									
Palau	---	---	---	---	0	0	Medium	High	High
639:									
Palau	---	---	---	---	0	0	Medium	High	High

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Hazard of soil slippage	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		cm	*cm*		*cm*	*cm*			
640:									
Palau, bedded tuff substratum-------	---	---	---	---	0	0	Medium	High	High
641:									
Palau, bedded tuff substratum-------	---	---	---	---	0	0	Medium	High	High
642:									
Palau, bedded tuff substratum-------	---	---	---	---	0	0	Medium	High	High
643:									
Palau, bedded tuff substratum-------	---	---	---	---	0	0	Medium	High	High
644:									
Palau, bedded tuff substratum-------	---	---	---	---	0	0	Medium	High	High
645:									
Peleliu-----------	Lithic bedrock	20-50	---	Indurated	0	0	Low	Moderate	Low
646:									
Peleliu-----------	Lithic bedrock	20-50	---	Indurated	0	0	Low	Moderate	Low
Chelbacheb--------	Lithic bedrock	10-40	---	Indurated	0	0	Low	High	Low
647:									
Peleliu-----------	Lithic bedrock	20-50	---	Indurated	0	0	Low	Moderate	Low
Chelbacheb--------	Lithic bedrock	10-40	---	Indurated	0	0	Low	High	Low
Rock outcrop------	Lithic bedrock	0	---	Indurated	0	0	Low	Moderate	Low
648:									
Tabecheding-------	Abrupt textural change	10-20	---	Noncemented	0	0	Medium	High	High
649:									
Tabecheding-------	Abrupt textural change	10-20	---	Noncemented	0	0	Medium	High	High
650:									
Aquic Dystrudepts	---	---	---	---	0	0	High	High	High

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Hazard of soil slippage	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		cm	*cm*		*cm*	*cm*			
651:									
Tabecheding-------	Abrupt textural change	10-20	---	Noncemented	0	0	Medium	High	High
652:									
Aquic Dystrudepts	---	---	---	---	0	0	High	High	High
653:									
Typic Udorthents, 30 to 75 percent slopes----------	---	---	---	---	0	0	High	High	Moderate
Typic Udorthents, 0 to 6 percent slopes----------	---	---	---	---	0	0	High	High	Moderate
654:									
Typic Udorthents--	---	---	---	---	0	0	High	High	Moderate
Urban land--------	Cemented material	0	---	Indurated	0	0	---	---	---
655:									
Quarry.									
656:									
Water, brackish.									
657:									
Water, fresh.									
659:									
Nekken, lower fertility--------	Lithic bedrock	50-100	---	Indurated	0	0	High	High	Moderate
Ollei, lower fertility--------	Lithic bedrock	15-50	---	Indurated	0	0	High	High	Moderate
660:									
Ollei, lower fertility--------	Lithic bedrock	15-50	---	Indurated	0	0	High	High	Moderate
Rock outcrop------	Lithic bedrock	0	---	Indurated	0	0	---	Moderate	---

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Hazard of soil slippage	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		cm	*cm*		*cm*	*cm*			
661:									
Ollei, lower fertility--------	Lithic bedrock	25-50	---	Indurated	0	0	High	High	Moderate
Nekken, lower fertility--------	Lithic bedrock	50-100	---	Indurated	0	0	High	High	Moderate

Table 20.--Taxonomic Classification of the Soils

Soil name	Family or higher taxonomic class
Aimeliik	Very-fine, halloysitic, isohyperthermic Typic Kandiperox
Aquic Dystrudepts	Very-fine, halloysitic, isohyperthermic Aquic Dystrudepts
Babelthuap	Very-fine, ferruginous, isohyperthermic Typic Kandiperox
Chelbacheb	Euic, isohyperthermic Lithic Udifolists
Chia	Sandy or sandy-skeletal, carbonatic, euic, isohyperthermic Terric Sulfihemists
Dechel	Very-fine, mixed, semiactive, acid, isohyperthermic Fluvaquentic Endoaquepts
Ilachetomel	Euic, isohyperthermic Typic Sulfihemists
Insak	Carbonatic, isohyperthermic Mollic Psammaquents
Majuro	Sandy-skeletal, carbonatic, isohyperthermic Typic Udorthents
Mesei	Clayey, mixed, euic, isohyperthermic Terric Haplosaprists
Naniak	Fine-loamy, mixed, superactive, acid, isohyperthermic Typic Sulfaquents
Nekken	Clayey-skeletal, mixed, active, isohyperthermic Typic Haplohumults
Ngardmau	Very-fine, parasesquic, isohyperthermic Oxic Dystrudepts
Ngatpang	Very-fine, halloysitic, isohyperthermic Typic Haploperox
Ngedebus	Sandy, carbonatic, isohyperthermic Typic Haprendolls
Ngersuul	Very-fine, mixed, active, isohyperthermic Fluvaquentic Dystrudepts
Odesangel	Sandy or sandy-skeletal, carbonatic, euic, isohyperthermic Terric Haplohemists
Ollei	Clayey-skeletal, parasesquic, isohyperthermic Humic Lithic Dystrudepts
Oxic Dystrudepts	Very-fine, halloysitic, isohyperthermic Oxic Dystrudepts
Palau	Very-fine, halloysitic, isohyperthermic Typic Haploperox
Peleliu	Clayey-skeletal, carbonatic, isohyperthermic Lithic Haprendolls
Tabecheding	Very-fine, halloysitic, isohyperthermic Aquic Kandiperox
Typic Udorthents	Very-fine, parasesquic, acid, isohyperthermic Typic Udorthents

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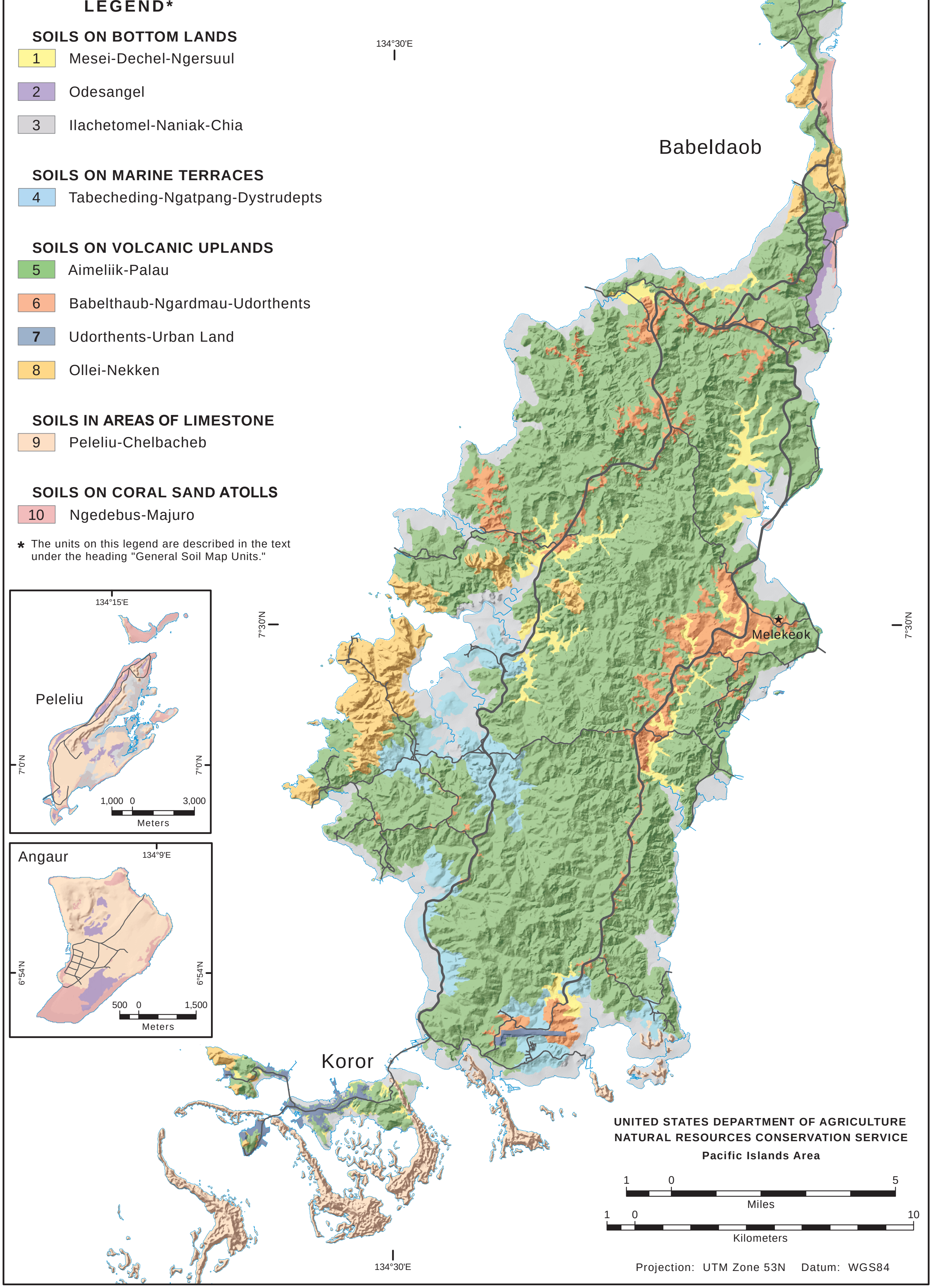
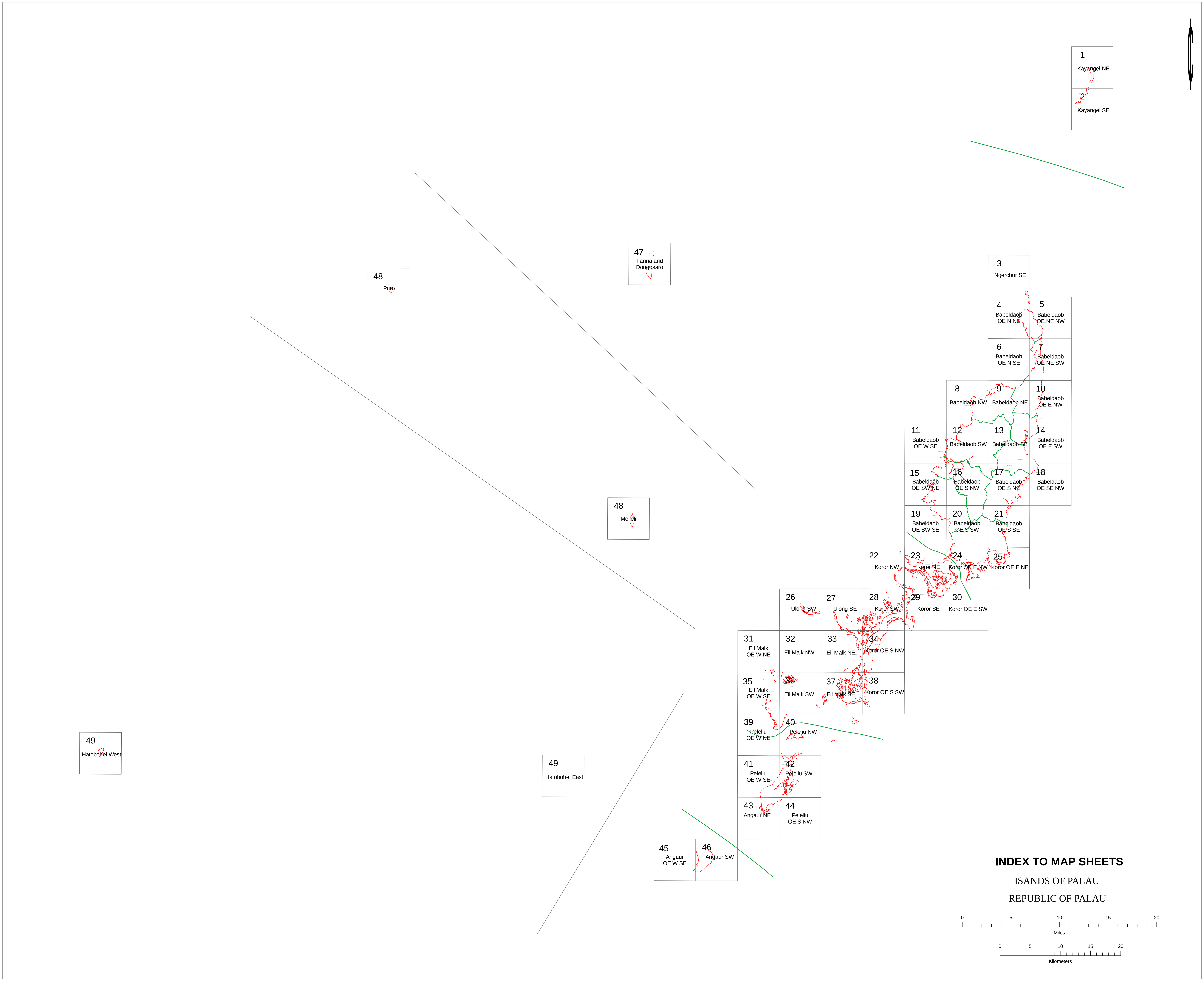
General Soil Map

The Soil Survey of the Islands of Palau
Republic of Palau




1 Kayangel NE
2 Kayangel SE
3 Ngerchur SE
4 Babeldaob OE N NE
5 Babeldaob OE NE NW
6 Babeldaob OE N SE
7 Babeldaob OE NE SW
8 Babeldaob NW
9 Babeldaob NE
10 Babeldaob OE E NW
11 Babeldaob OE W SE
12 Babeldaob SW
13 Babeldaob SE
14 Babeldaob OE E SW
15 Babeldaob OE SW NE
16 Babeldaob OE S NW
17 Babeldaob OE S NE
18 Babeldaob OE SE NW
19 Babeldaob OE SW SE
20 Babeldaob OE S SW
21 Babeldaob OE S SE
22 Koror NW
23 Koror NE
24 Koror OE E NW
25 Koror OE E NE
26 Ulong SW
27 Ulong SE
28 Koror SW
29 Koror SE
30 Koror OE E SW
31 Eil Malk OE W NE
32 Eil Malk NW
33 Eil Malk NE
34 Koror OE S NW
35 Eil Malk OE W SE
36 Eil Malk SW
37 Eil Malk SE
38 Koror OE S SW
39 Peleliu OE W NE
40 Peleliu NW
41 Peleliu OE W SE
42 Peleliu SW
43 Angaur NE
44 Peleliu OE S NW
45 Angaur OE W SE
46 Angaur SW
47 Fanna and Dongosaro
48 Puro
48 Melieli
49 Hatobohei West
49 Hatobohei East
INDEX TO MAP SHEETS
ISANDS OF PALAU
REPUBLIC OF PALAU
0 5 10 15 20
Miles
0 5 10 15 20
Kilometers

SOIL LEGEND

SYMBOL	NAME
600	Aimeliik silt loam, 2 to 6 percent slopes
601	Aimeliik silt loam, 6 to 12 percent slopes
602	Aimeliik silt loam, 12 to 30 percent slopes
603	Aimeliik silt loam, 30 to 50 percent slopes
604	Aimeliik silt loam, 50 to 75 percent slopes
605	Aimeliik silt loam, bedded tuff substratum, 2 to 6 percent slopes
606	Aimeliik silt loam, bedded tuff substratum, 6 to 12 percent slopes
607	Aimeliik silt loam, bedded tuff substratum, 12 to 30 percent slopes
608	Aimeliik silt loam, bedded tuff substratum, 30 to 50 percent slopes
609	Aimeliik silt loam, bedded tuff substratum, 50 to 75 percent slopes
610	Aimeliik-Ollei complex, 20 to 55 percent slopes
611	Aimeliik-Ollei complex, 40 to 75 percent slopes
612	Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 2 to 6 percent slopes
613	Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 6 to 12 percent slopes
614	Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes
615	Chia-Insak complex, 0 to 1 percent slopes
616	Dechel silty clay, 0 to 2 percent slopes
617	Ilachetomel-Naniak complex, 0 to 1 slopes
618	Mesei-Dechel complex, 0 to 2 percent slopes
619	Nekken-Ollei complex, 12 to 30 percent slopes
620	Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 20 to 50 percent slopes
621	Ngardmau-Babelthuap-Typic Udorthents undifferentiated group, 50 to 75 percent slopes
622	Oxic Dystrudepts, 2 to 6 percent slopes
623	Oxic Dystrudepts, 12 to 50 percent slopes
624	Ngatpang silty clay loam, 2 to 6 percent slopes
625	Ngatpang silty clay loam, 6 to 12 percent slopes
626	Ngatpang silty clay loam, 12 to 30 percent slopes
627	Ngatpang silty clay loam, well drained, 30 to 50 percent slopes
628	Ngedebus highly organic fine sandy loam, 0 to 3 percent slopes
629	Majuro extremely cobbly fine sandy loam, 2 to 6 percent slopes
630	Ngersuul silt loam, 0 to 4 percent slopes
631	Odesangel peat, 0 to 1 percent slopes
632	Ollei-Nekken complex, 30 to 50 percent slopes
633	Ollei-Nekken complex, 50 to 75 percent slopes
634	Ollei-Rock outcrop complex, 12 to 75 percent slopes
635	Palau silt loam, 2 to 6 percent slopes
636	Palau silty clay loam, 6 to 12 percent slopes
637	Palau silt loam, 12 to 30 percent slopes
638	Palau silt loam, 30 to 50 percent slopes
639	Palau silt loam, 50 to 75 percent slopes
640	Palau silty clay loam, bedded tuff substratum, 2 to 6 percent slopes
641	Palau silty clay loam, bedded tuff substratum, 6 to 12 percent slopes
642	Palau silt loam, bedded tuff substratum, 12 to 30 percent slopes
643	Palau silty clay loam, bedded tuff substratum, 30 to 50 percent slopes
644	Palau silty clay loam, bedded tuff substratum, 50 to 75 percent slopes
645	Peleliu extremely cobbly clay loam, 0 to 4 percent slopes
646	Peleliu-Chelbacheb complex, 6 to 20 percent slopes
647	Peleliu-Chelbacheb-Rock outcrop complex, 80 to 150 percent slopes
648	Tabecheding silty clay loam, 2 to 6 percent slopes
649	Tabecheding silty clay loam, 6 to 12 percent slopes
650	Aquic Dystrudepts, 2 to 12 percent slopes
651	Tabecheding silty clay loam, 12 to 30 percent slopes
652	Aquic Dystrudepts, 12 to 30 percent slopes
653	Typic Udorthents complex, mined, 0 to 75 percent slopes
654	Orthents-Urban land complex, 0 to 50 percent slopes
655	Quarry
656	Water, brackish
657	Water, fresh
659	Nekken-Ollei complex, lower fertility, 12 to 30 percent slopes
660	Ollei-Rock outcrop complex, lower fertility, 30 to 50 percent slopes
661	Ollei-Nekken complex, lower fertility, 50 to 75 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline and neatline
- Previously published survey

OTHER BOUNDARY

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEMS AND DESIGNATIONS

- Interstate — 173, 79 345
- Federal — 287, 410 224
- State — 52, 52 347
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE

PIPELINE

FENCE

LEVEES

- Without road
- With road
- With railroad
- Single side slope

DAMS

- Medium or small

LANDFORM FEATURES

- Prominent hill or peak

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house
- Church
- School
- Other religion — Mt Carmel
- Located object — Ranger Station
- Tank — Petroleum
- Lookout tower
- Oil and/or natural gas wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial stream, double line
- Perennial stream, single line — Label only
- Intermittent stream — Label only
- Drainage end — Label only

DRAINAGE AND IRRIGATION

- Double-line canal — CANAL
- Perennial drainage and/or irrigation ditch — Label only
- Intermittent drainage and/or irrigation ditch — Label only

SMALL LAKES, PONDS, AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — 600 622

LANDFORM FEATURES

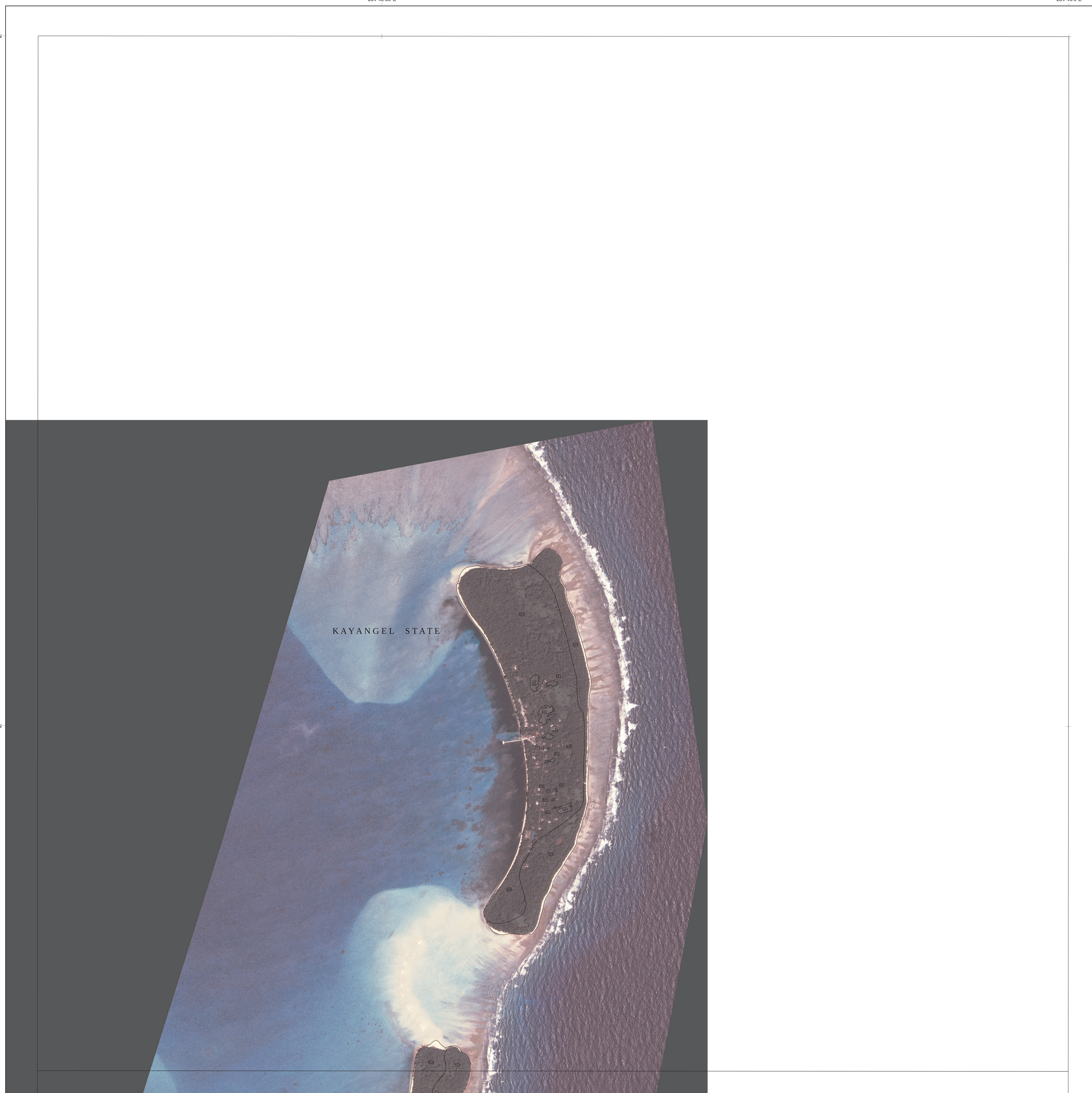
- Bedrock escarpment
- Other than bedrock escarpment
- Short steep slope
- Gully
- Depression, closed
- Sinkhole
- Borrow pit
- Gravel pit
- Mine or quarry
- Landfill

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava spot
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

134°42'30"E 134°45'0"E

8°7'30"N 8°7'30"N



8°5'0"N 8°5'0"N

134°42'30"E 134°45'0"E

Joins Sheet 2, Kayangel SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).
Universal Transverse Mercator (UTM) coordinate system.

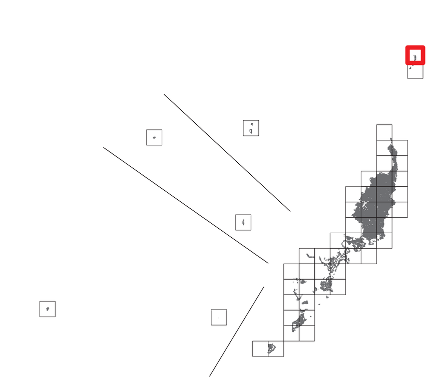
N

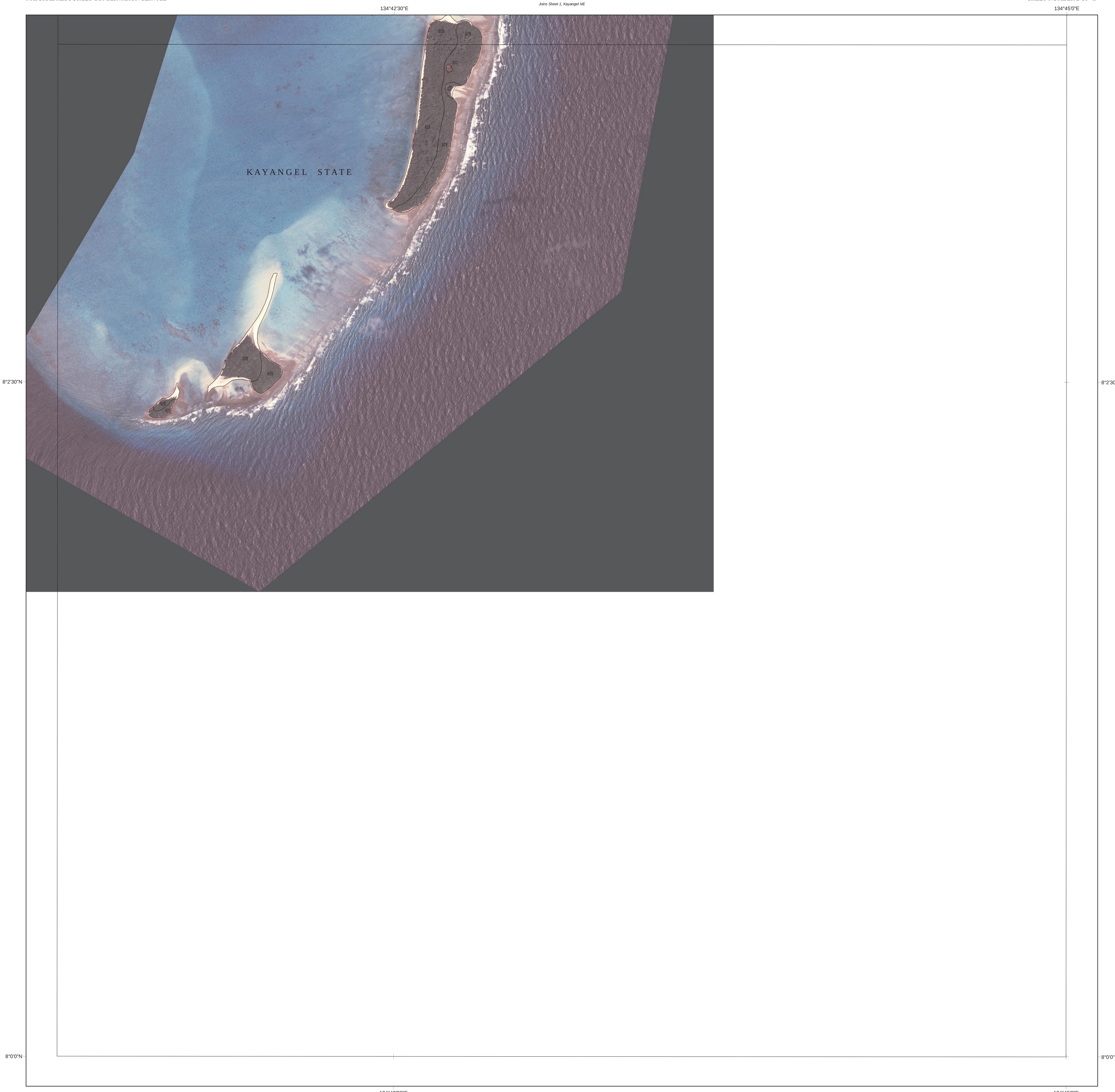
1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000





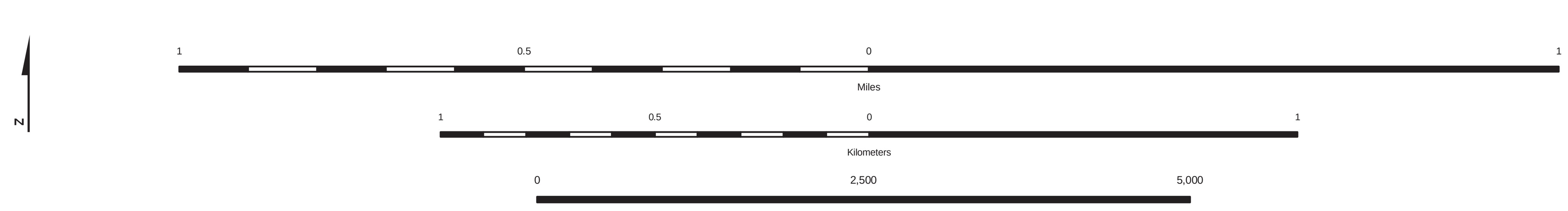
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

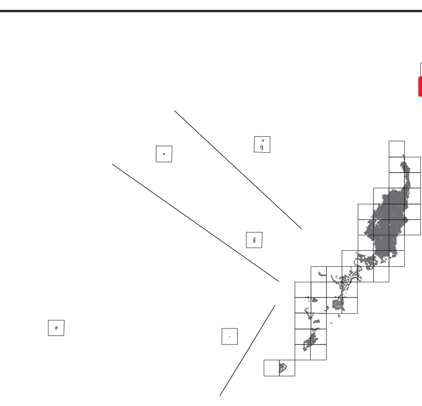
National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

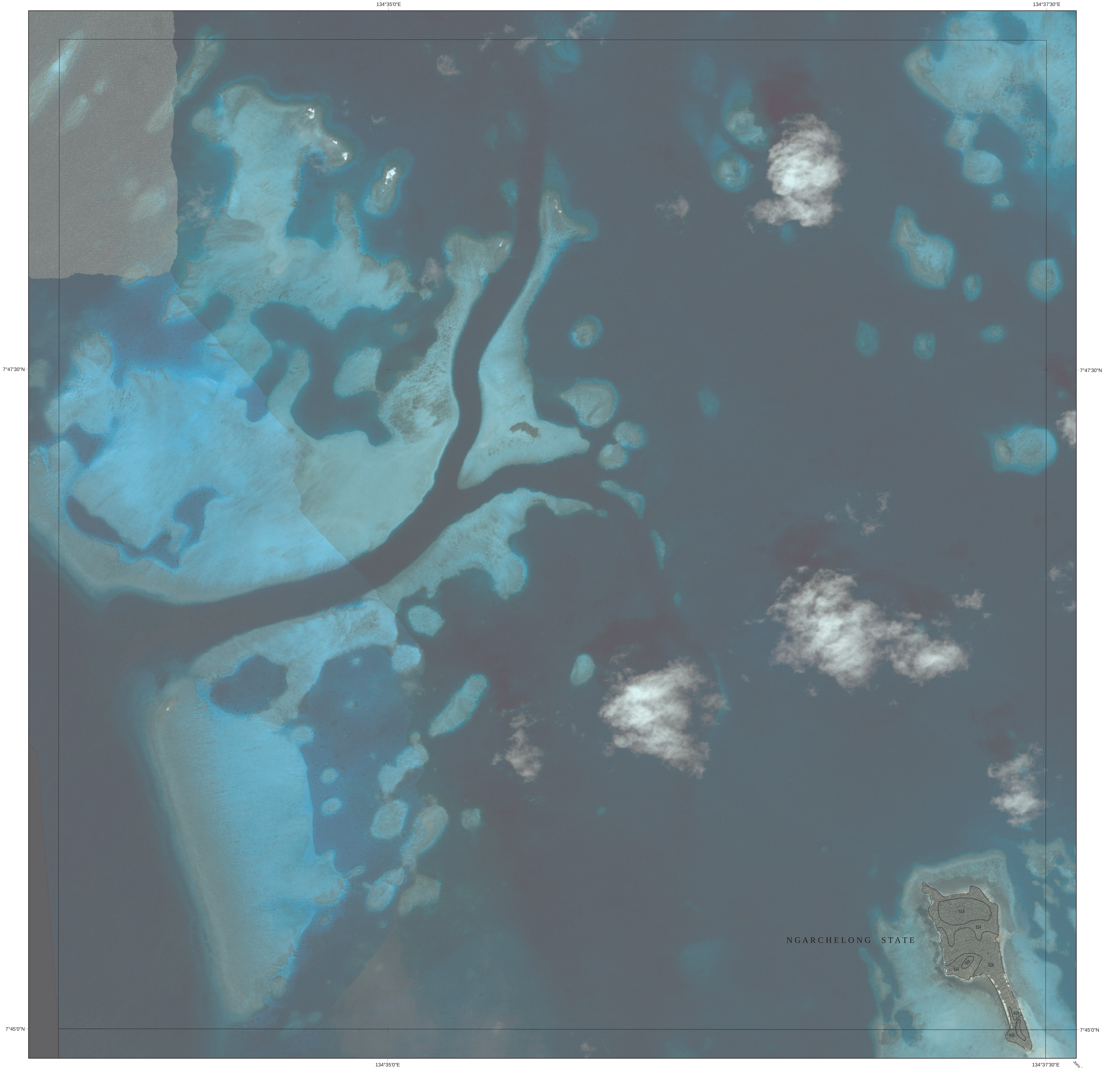
World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.



SCALE 1:12000





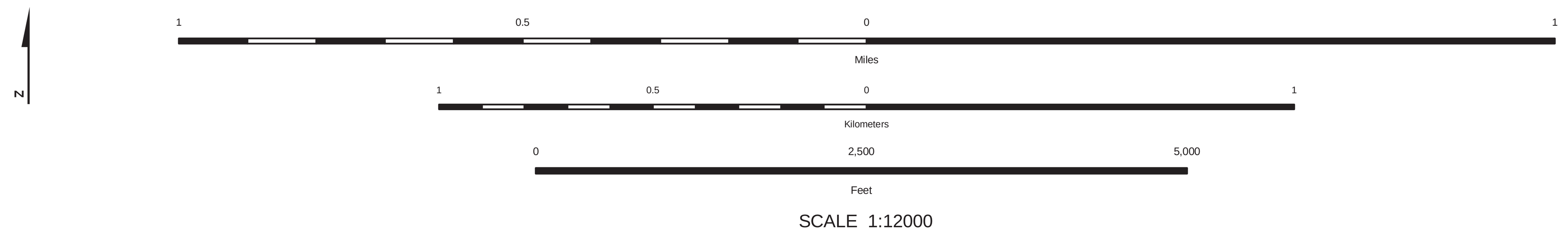
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

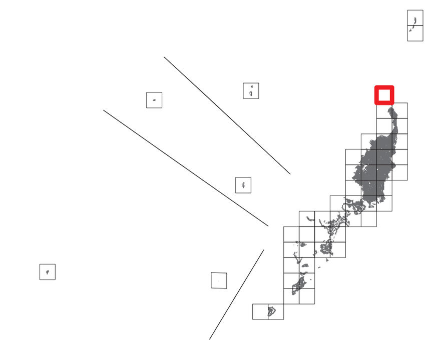
National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).

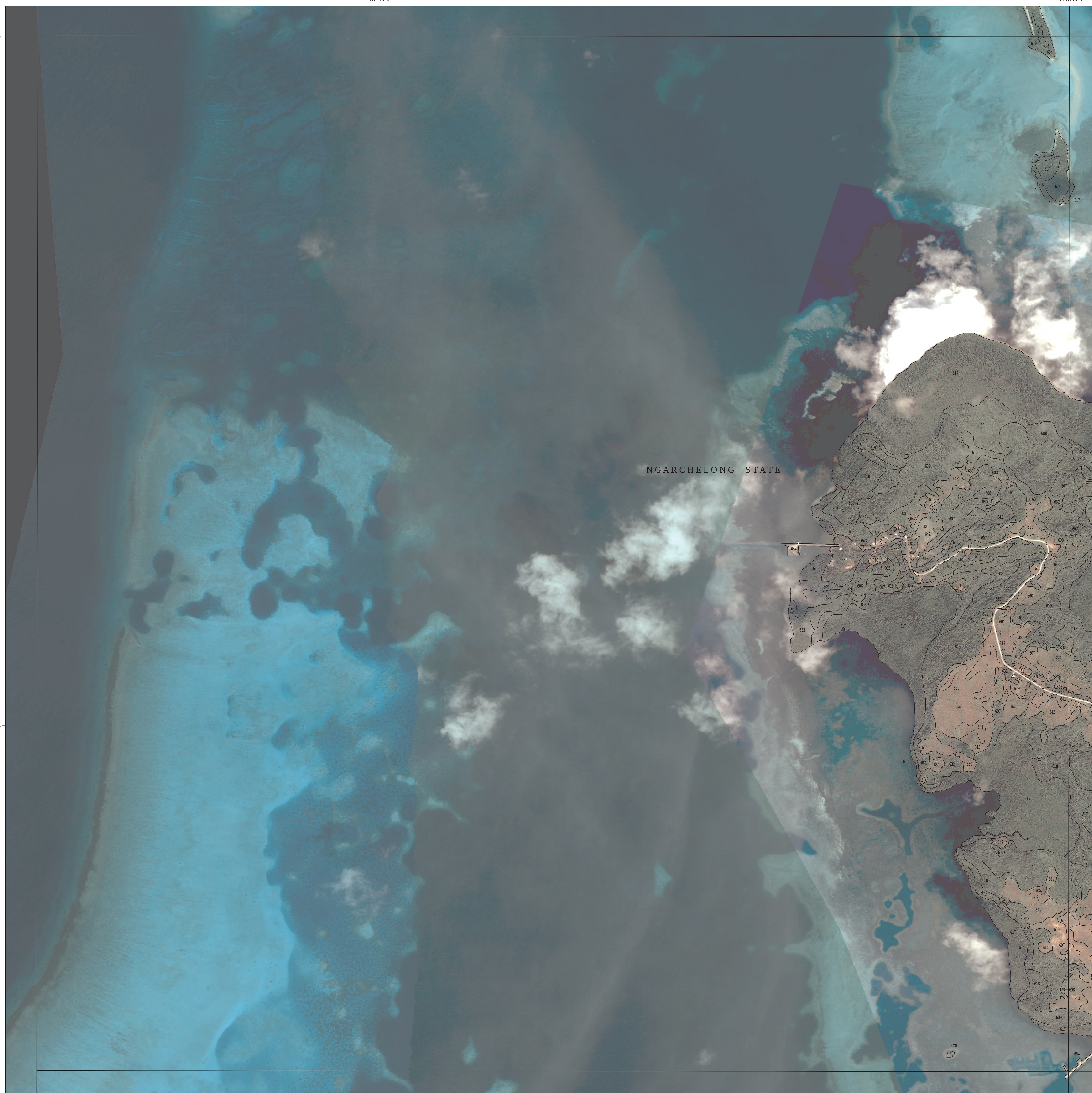
Universal Transverse Mercator (UTM) coordinate system.



SCALE 1:12000



Joins Sheet 3, Ngerchur SE



Joins Sheet 6, Babeldaob OE N SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

UNITED STATES
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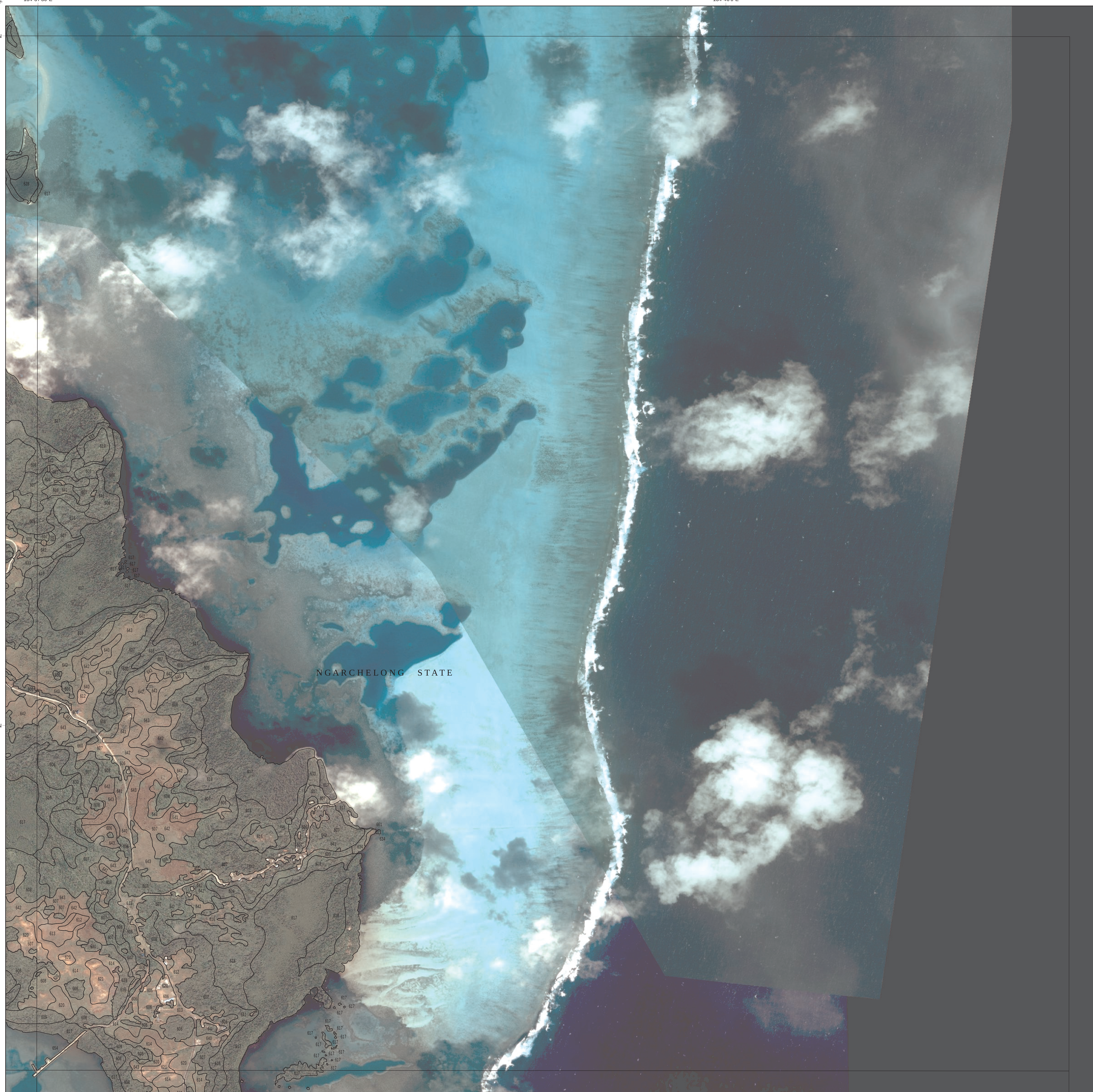
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

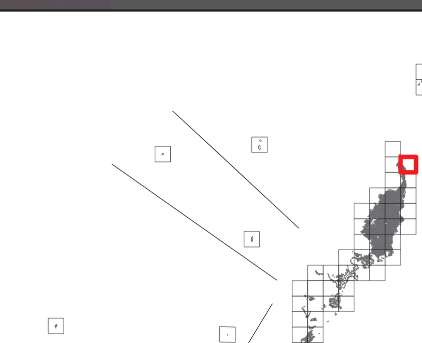
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

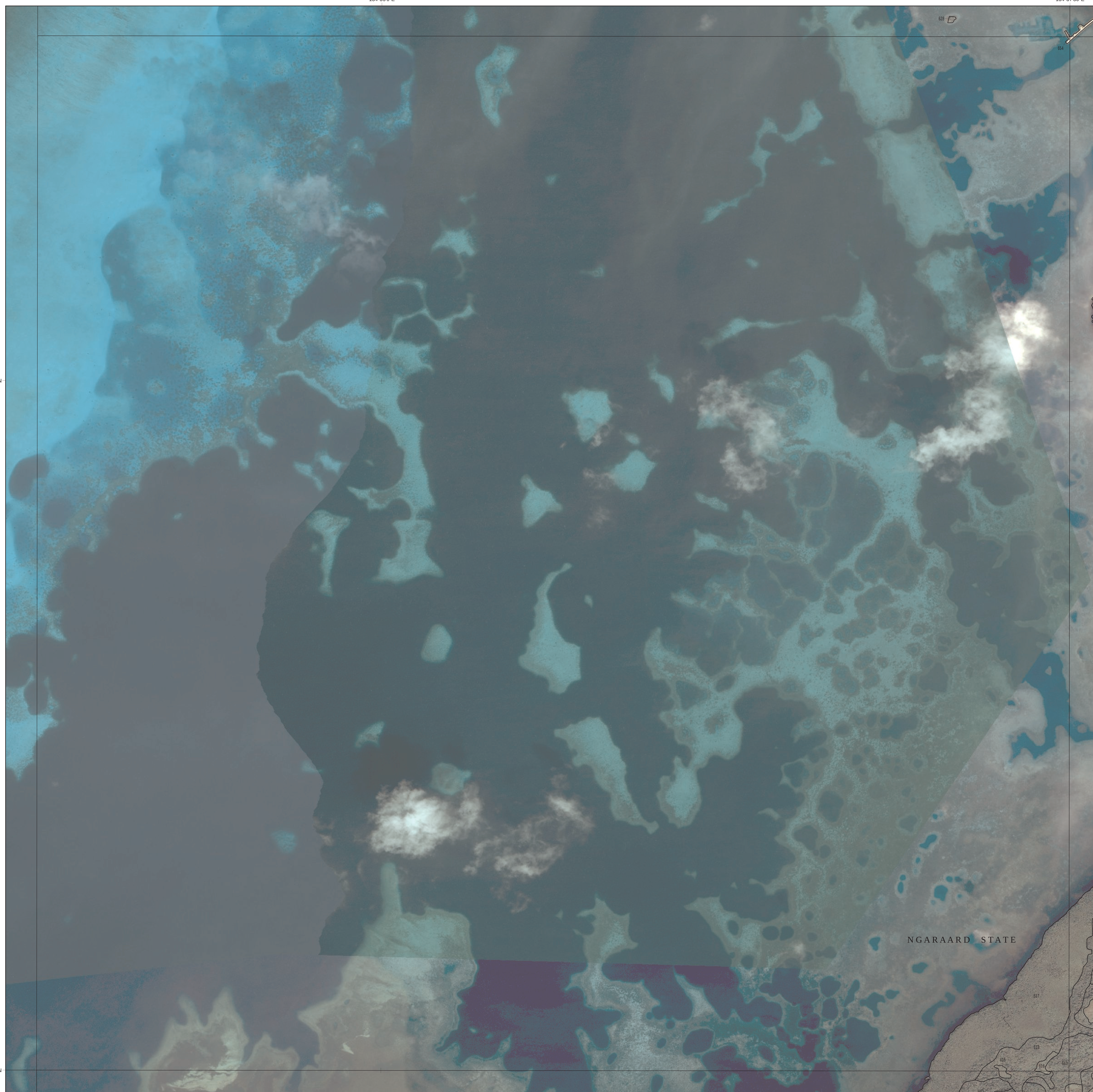
SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 5 OF 49

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

N

1 0.5 0 1
Miles

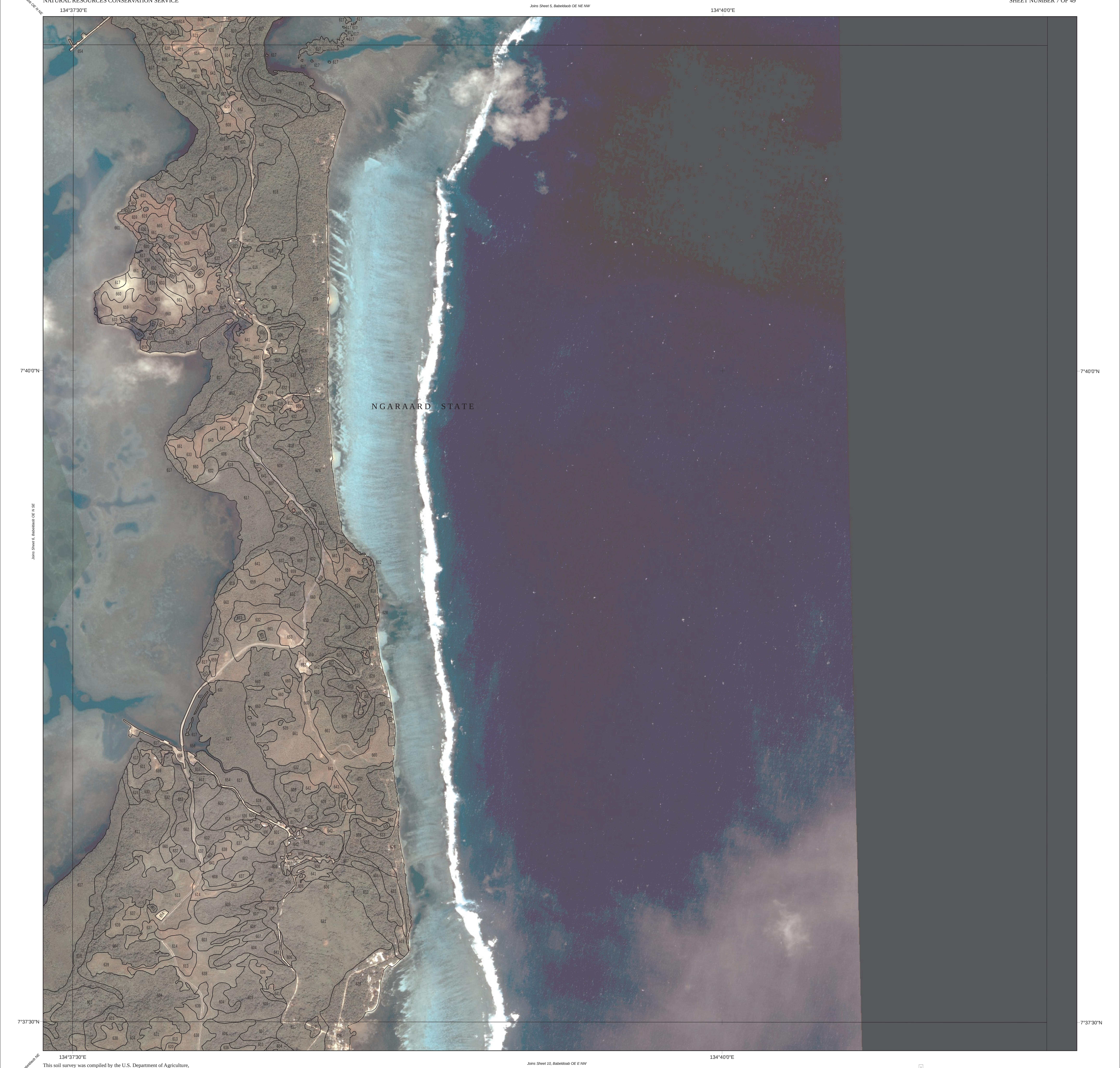
1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
BABELDAOB OE NE SW
SHEET NUMBER 7 OF 49



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

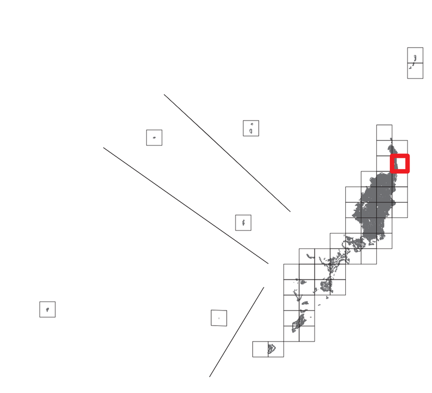
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

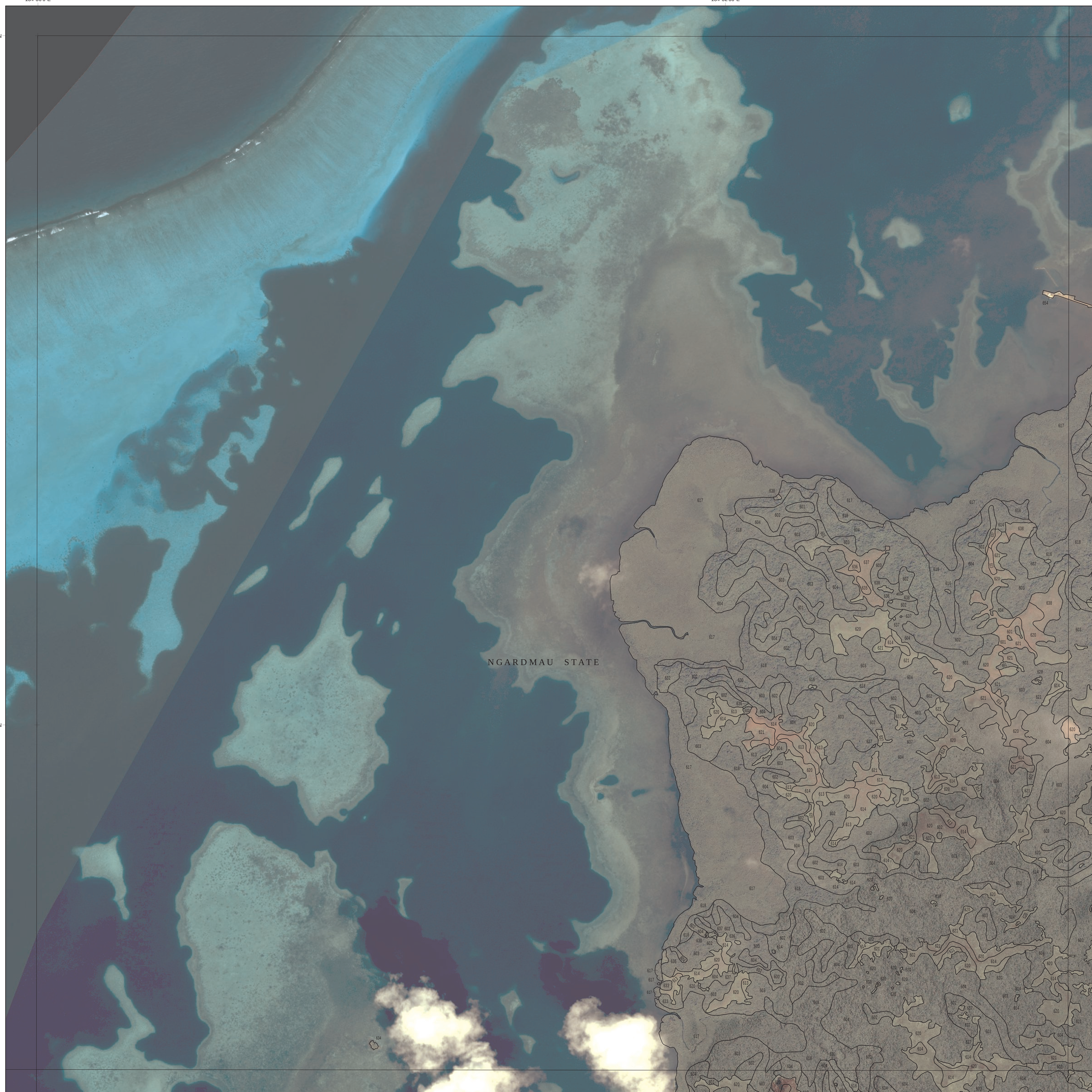
0 2,500 5,000
Feet

SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 7 OF 49



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Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

N

1 0.5 0 1
Miles

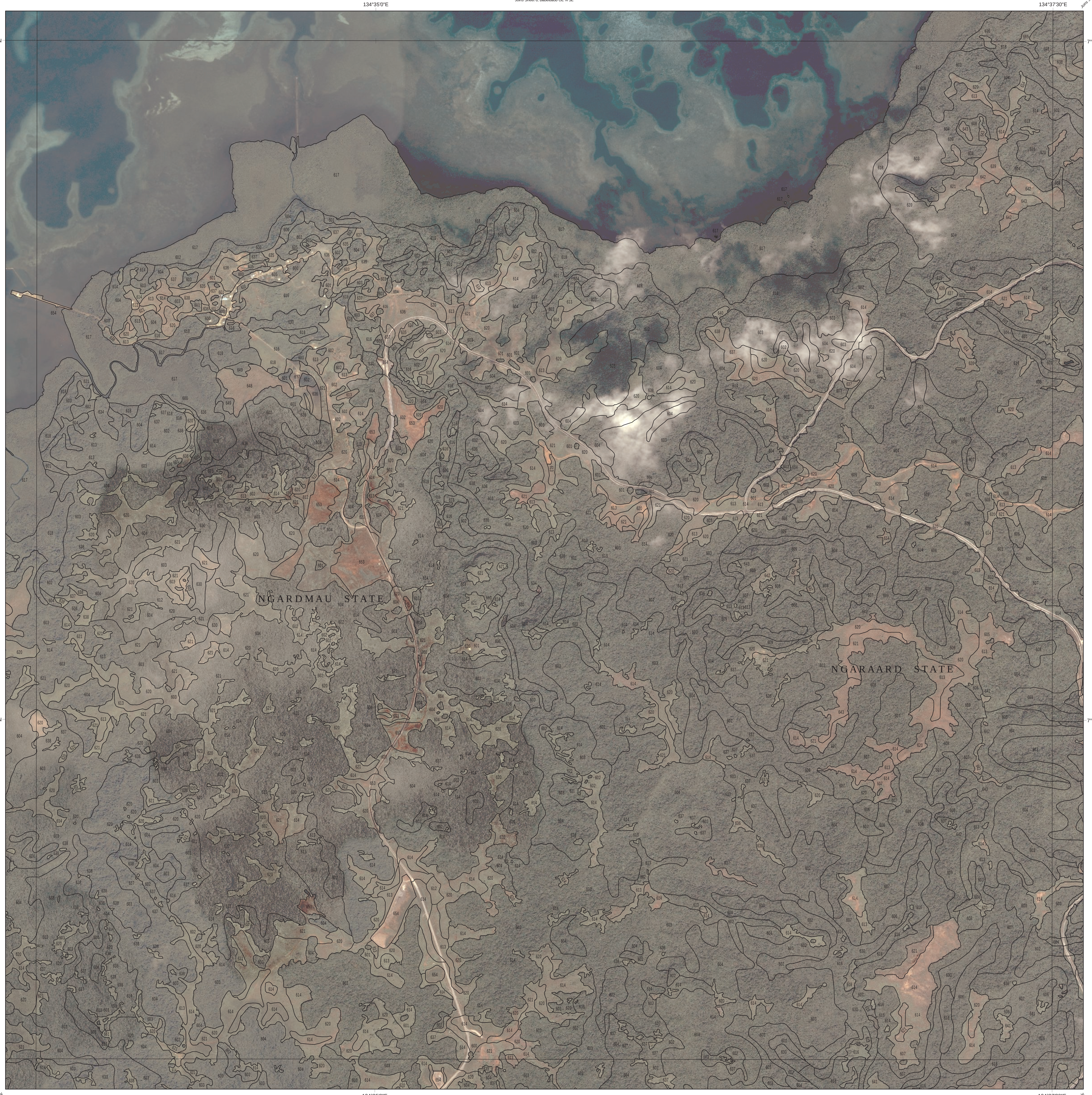
1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
BABELDAOB NE
SHEET NUMBER 9 OF 49



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service.

Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

National Hydrography Dataset (NHD), National Elevation Dataset (NED) and Geographic Names Information System (GNIS) provided by the U.S. Department of Interior, U.S. Geologic Survey (USGS).

World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

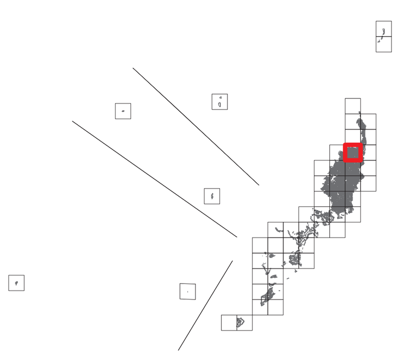
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

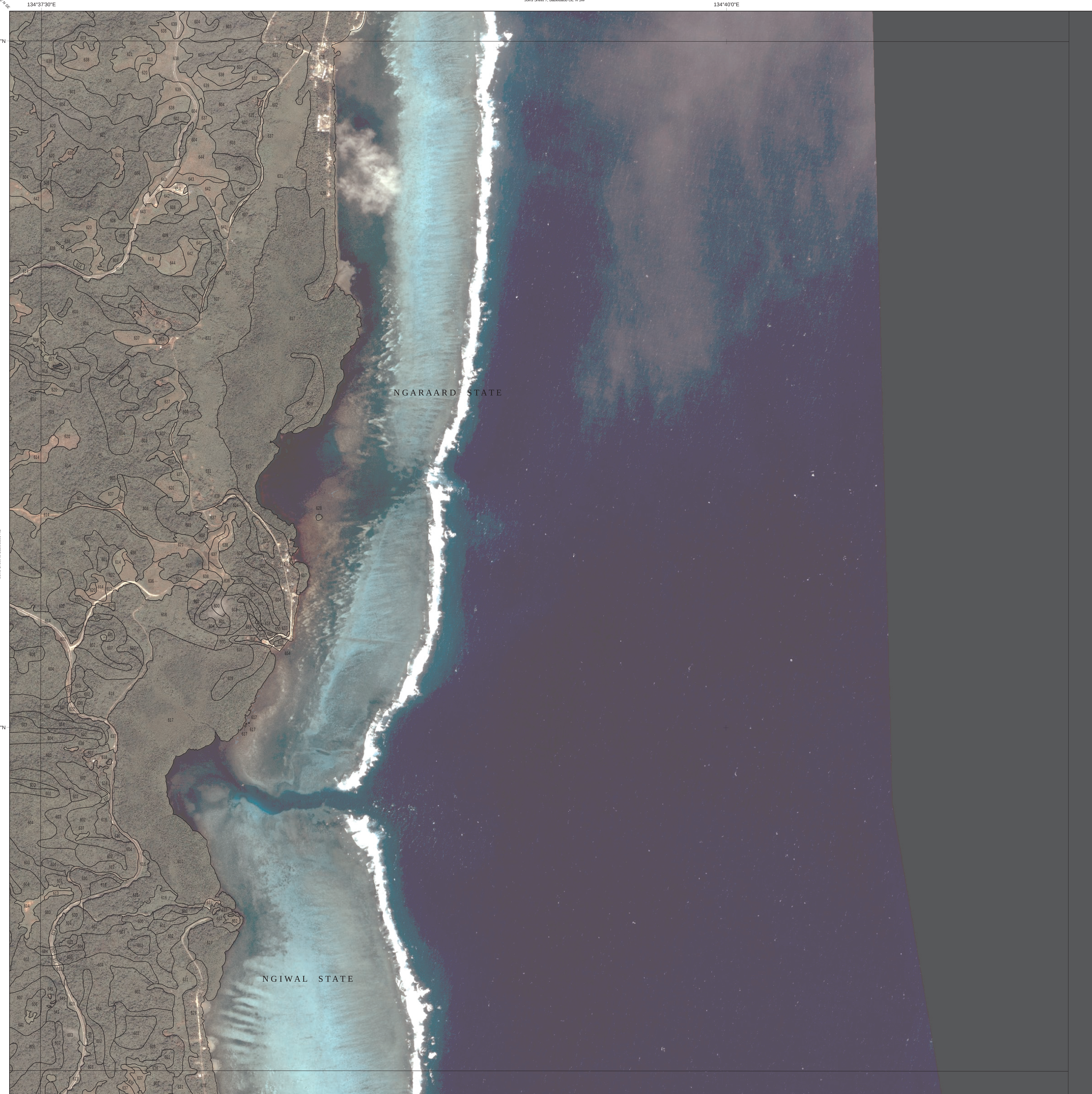
SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 9 OF 49

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system.

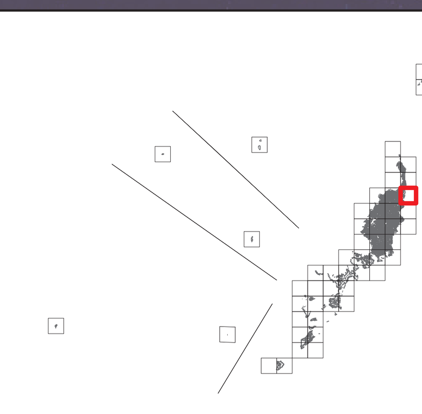
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

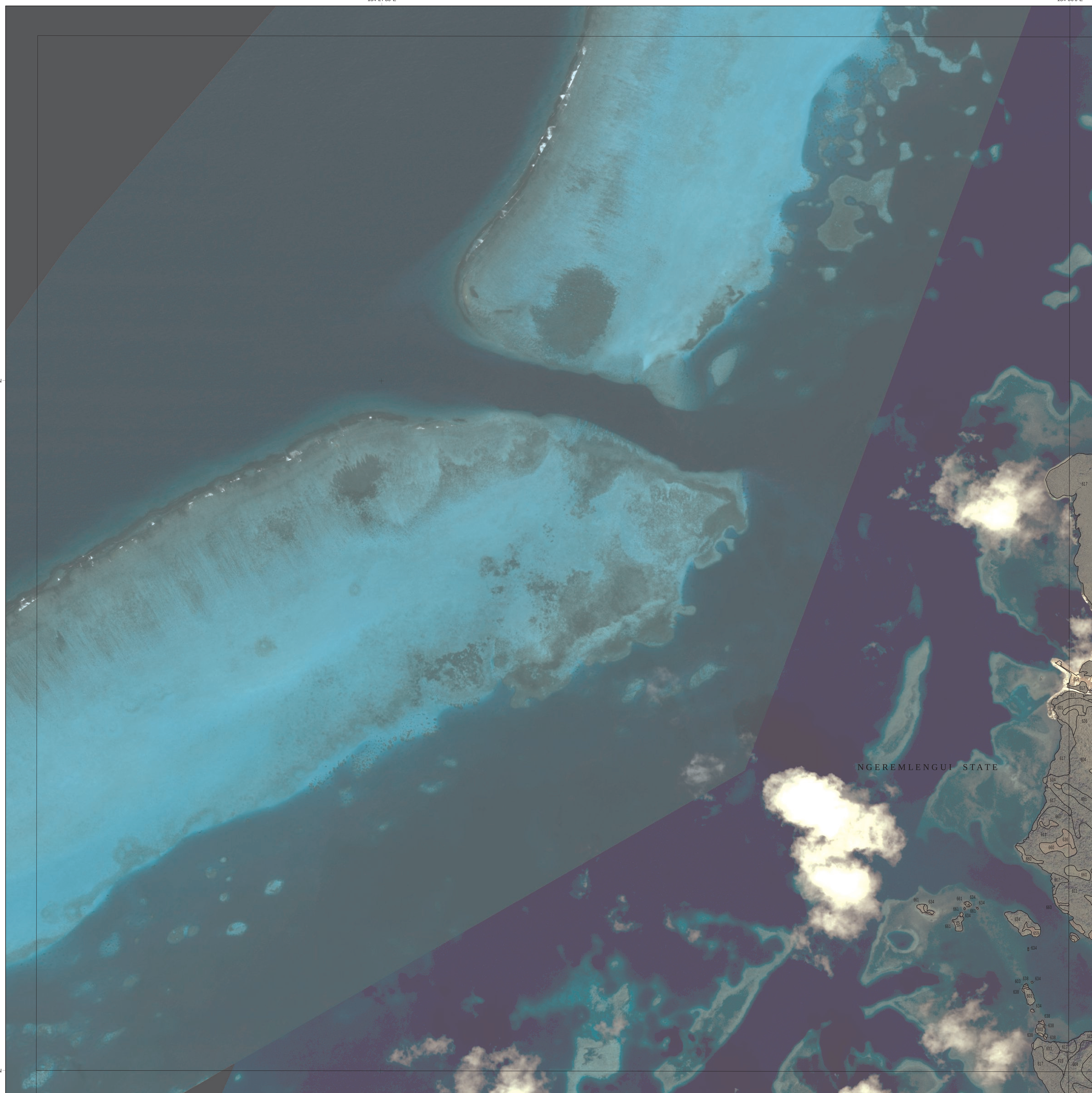
SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

134°27'30"E 134°30'0"E

7°32'30"N 7°32'30"N



Joins Sheet 12, Babeldaob SW

7°30'0"N 7°30'0"N

134°27'30"E 134°30'0"E

Joins Sheet 15, Babeldaob OE SW NE

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

Joins Sheet 8, Babeldaob NW

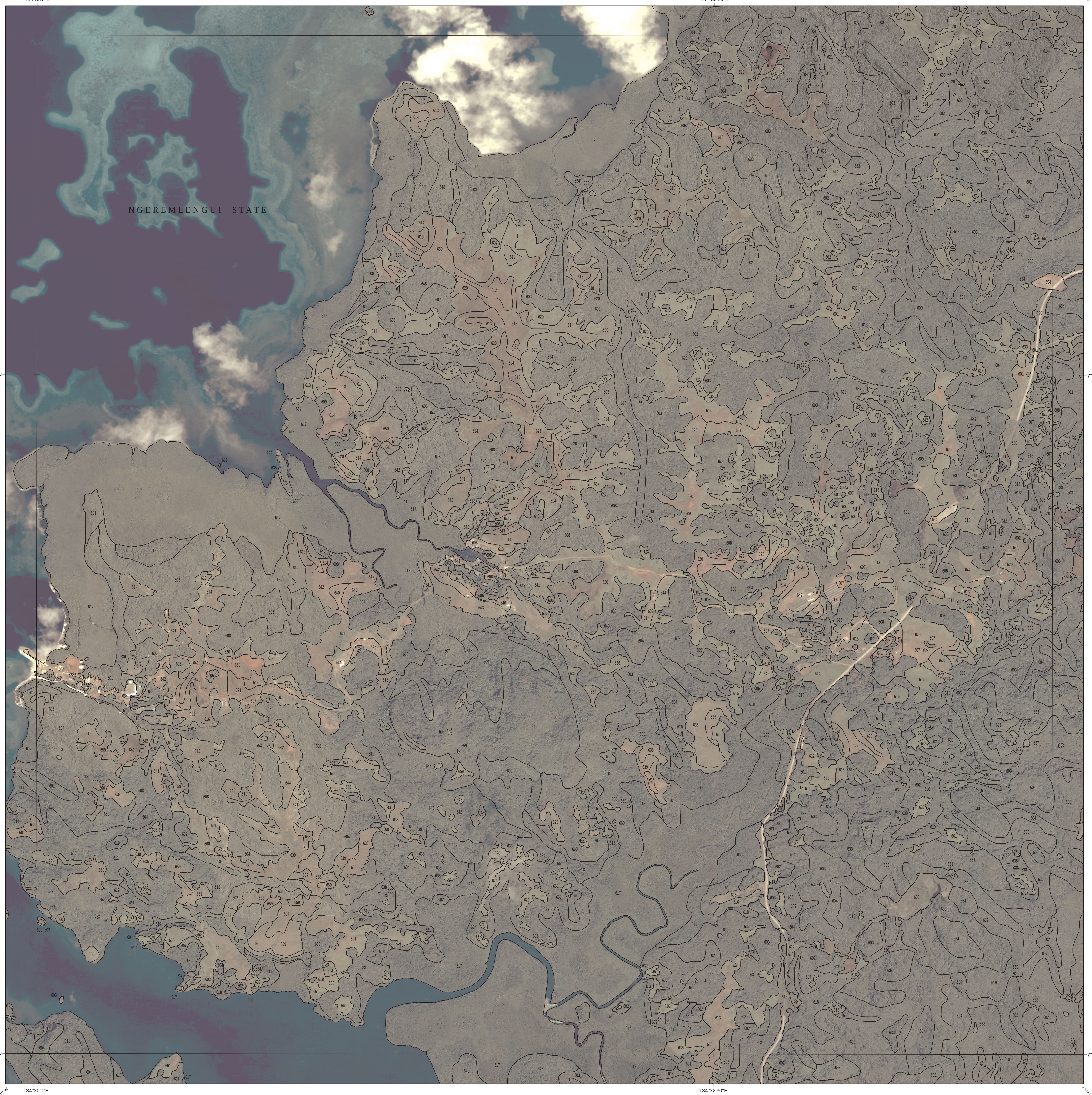
Joins Sheet 9, Babeldaob NE

134°30'0"E   134°32'30"E

7°32'30"N   7°32'30"N

Joins Sheet 11, Babeldaob OE W SE

Joins Sheet 13, Babeldaob SE



7°30'0"N   7°30'0"N

134°30'0"E   134°32'30"E

Joins Sheet 15, Babeldaob OE SW NE

Joins Sheet 16, Babeldaob OE S NW

Joins Sheet 17, Babeldaob OE S NE

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Digital Orthoimagery provided by DigitalGlobe, Inc., 2004-2006.

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1   0.5   0   1
Miles

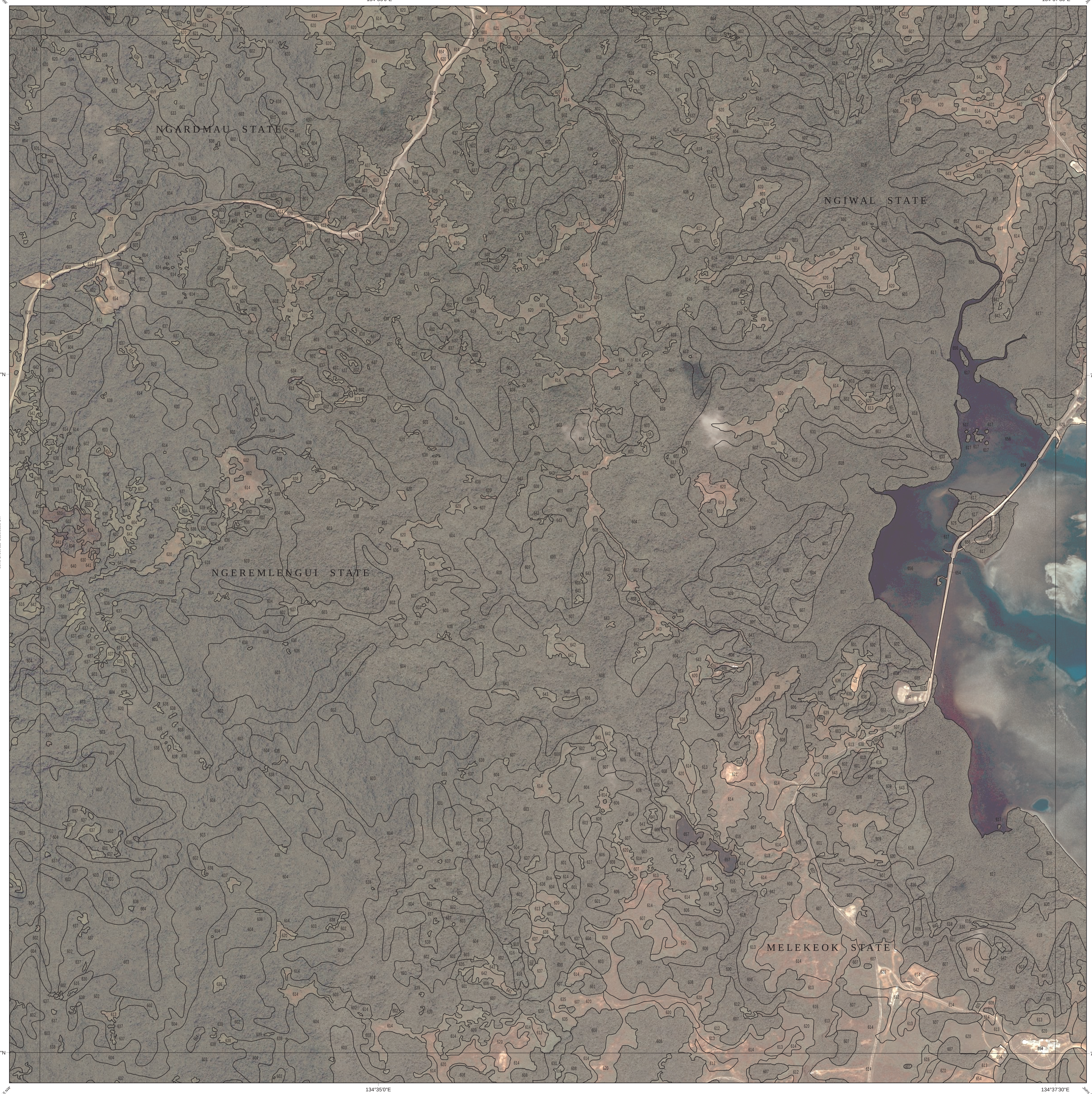
1   0.5   0   1
Kilometers

0   2,500   5,000
Feet

SCALE 1:12000

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

134°35'0"E 134°37'30"E



134°35'0"E 134°37'30"E

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

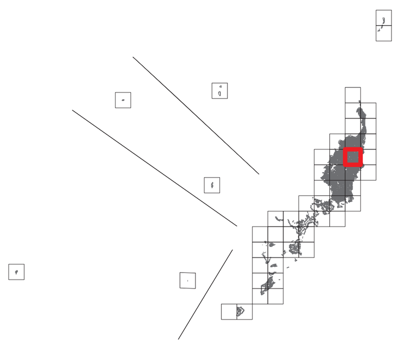
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

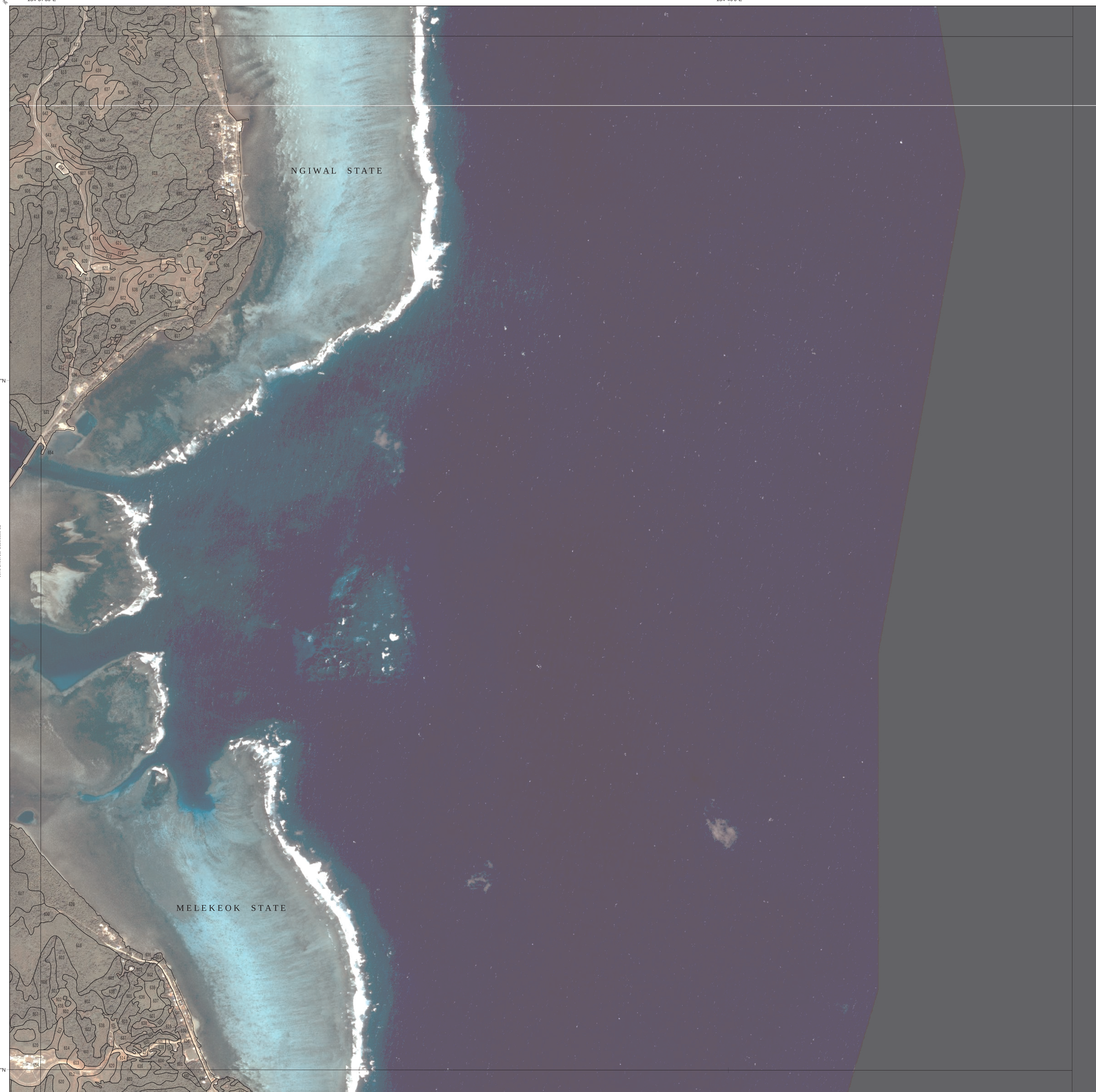
SCALE 1:12000



UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
BABELDAOB OE E SW
SHEET NUMBER 14 OF 49

Joins Sheet 10, Babeldaob OE E NW



Joins Sheet 13, Babeldaob SE

Joins Sheet 18, Babeldaob OE SE NW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

Miles

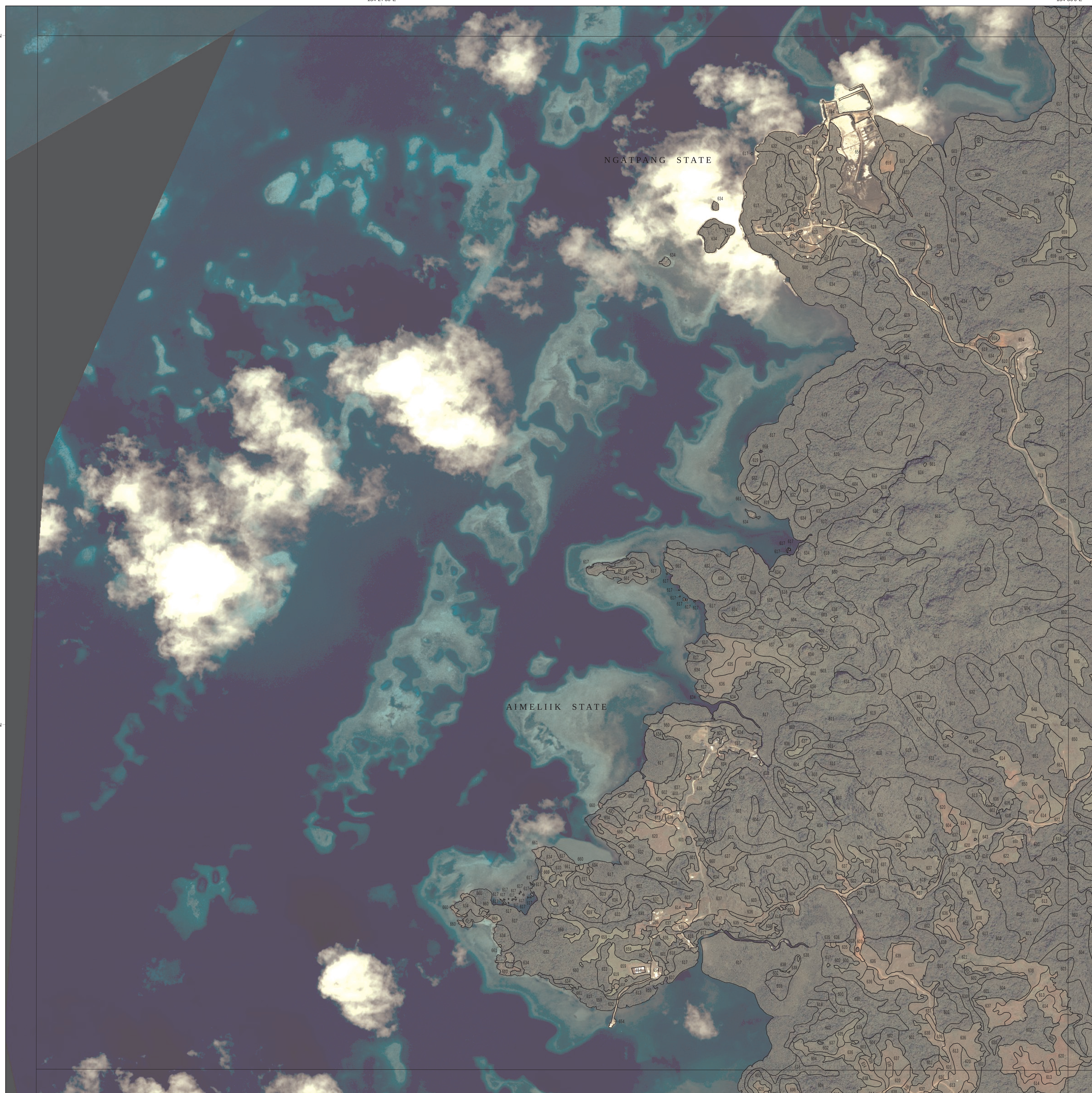
Kilometers

Feet

SCALE 1:12000

ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 14 OF 49



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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

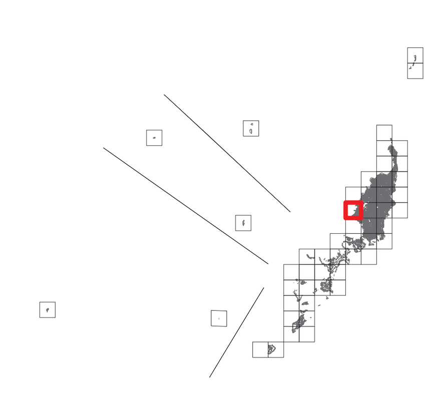
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



Joins Sheet 11, Babeldaob OE W SE

Joins Sheet 12, Babeldaob SW

Joins Sheet 13, Babeldaob SE

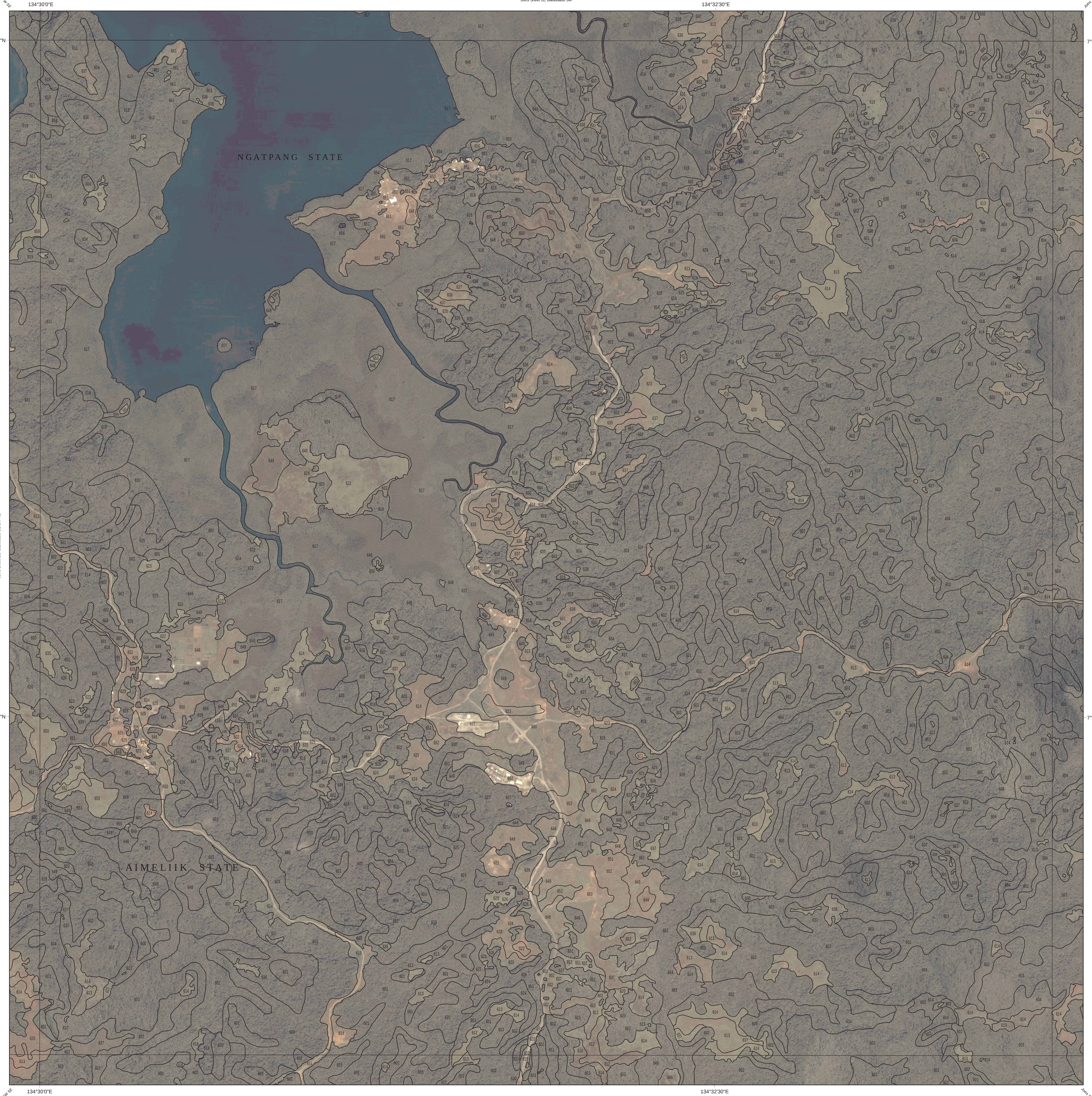
134°30'0"E

134°32'30"E

7°30'0"N

Joins Sheet 15, Babeldaob OE SW NE

Joins Sheet 17, Babeldaob OE S NE



7°27'30"N

134°30'0"E

134°32'30"E

Joins Sheet 19, Babeldaob OE SW SE

Joins Sheet 20, Babeldaob OE S SW

Joins Sheet 21, Babeldaob OE S SE

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

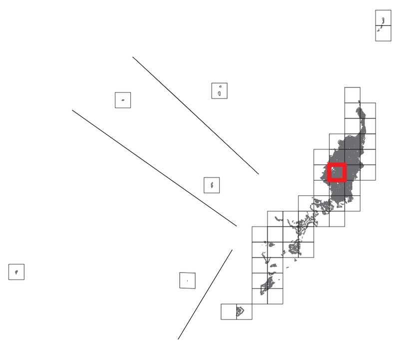
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

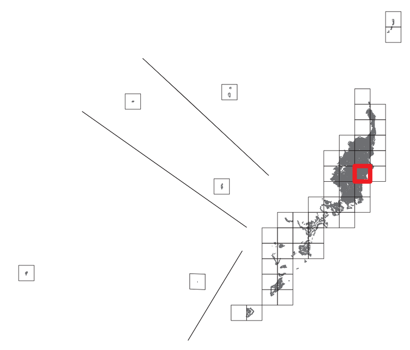
N

Miles: 1 0.5 0 1

Kilometers: 1 0.5 0 1

Feet: 0 2,500 5,000

SCALE 1:12000



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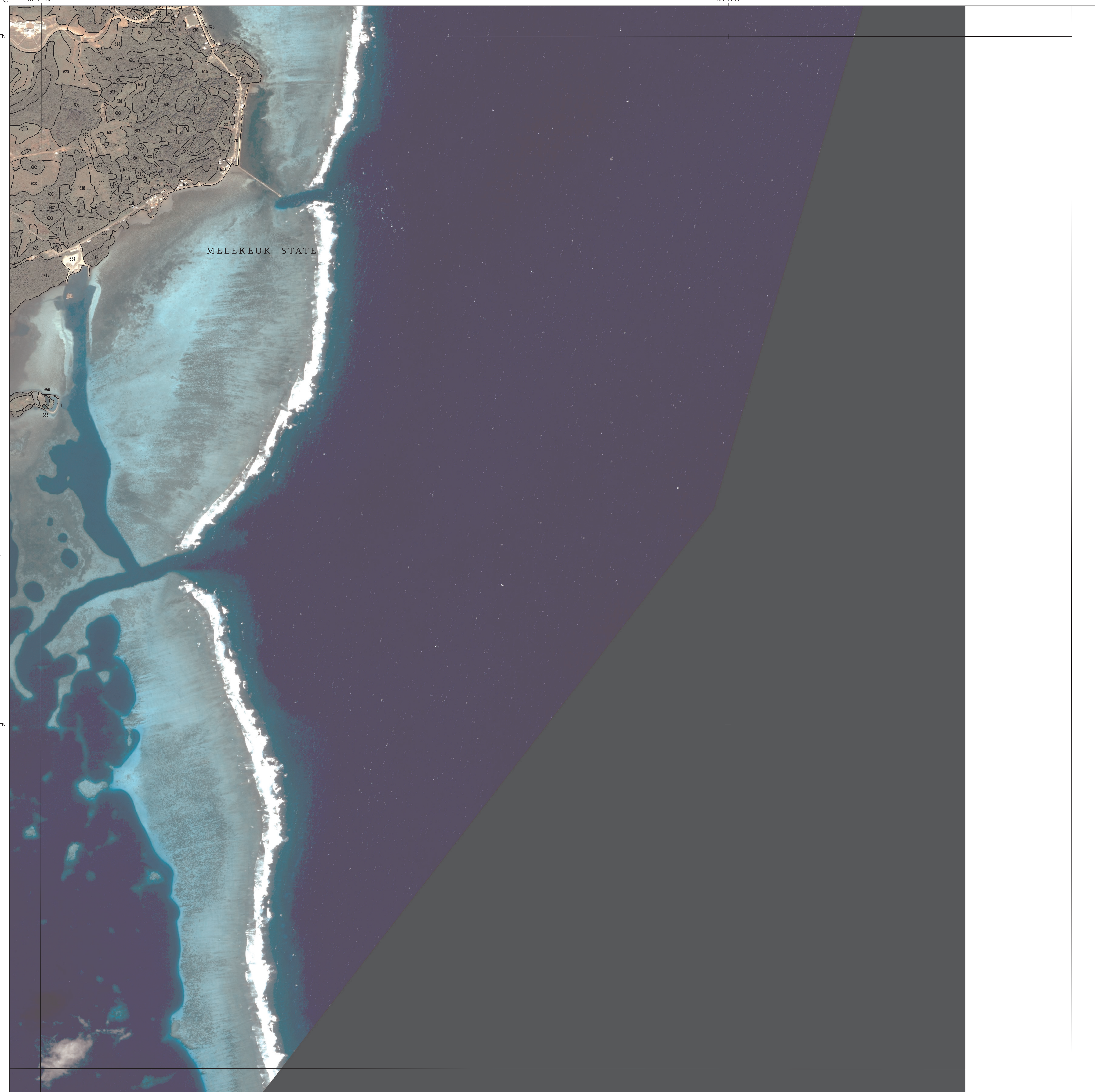
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
BABELDAOB OE SE NW
SHEET NUMBER 18 OF 49



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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

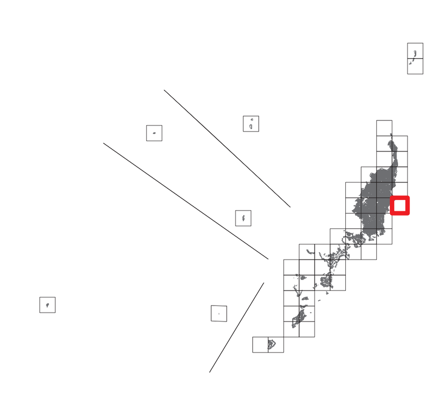
N

Miles: 1 — 0.5 — 0 — 1

Kilometers: 1 — 0.5 — 0 — 1

Feet: 0 — 2,500 — 5,000

SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 18 OF 49

Joins Sheet 15, Babeldaob OE SW NE

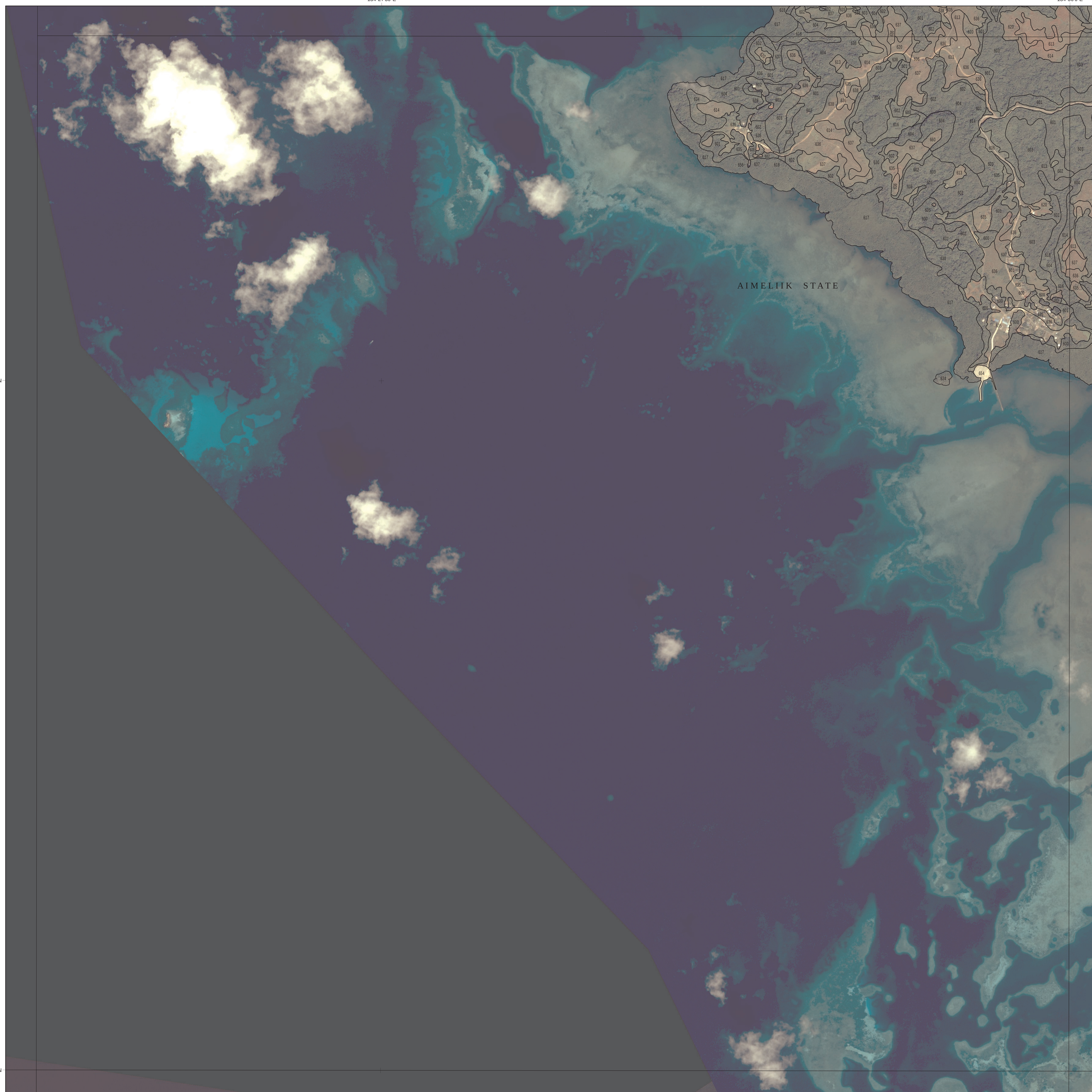
Joins Sheet 16, Babeldaob OE S NW

134°27'30"E

134°30'0"E

7°25'0"N

7°25'0"N



Joins Sheet 20, Babeldaob OE S SW

7°22'30"N

7°22'30"N

134°27'30"E

134°30'0"E

Joins Sheet 22, Koror NW

Joins Sheet 23, Koror NE

Joins Sheet 24, Koror OE S NW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1 0.5 0 1

Miles

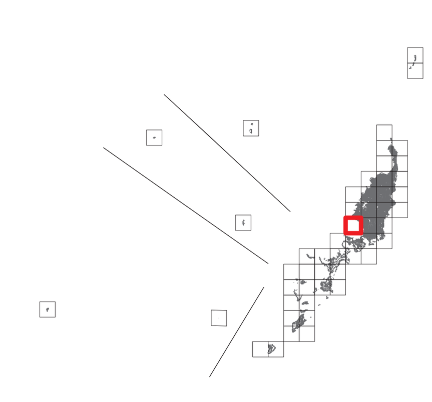
1 0.5 0 1

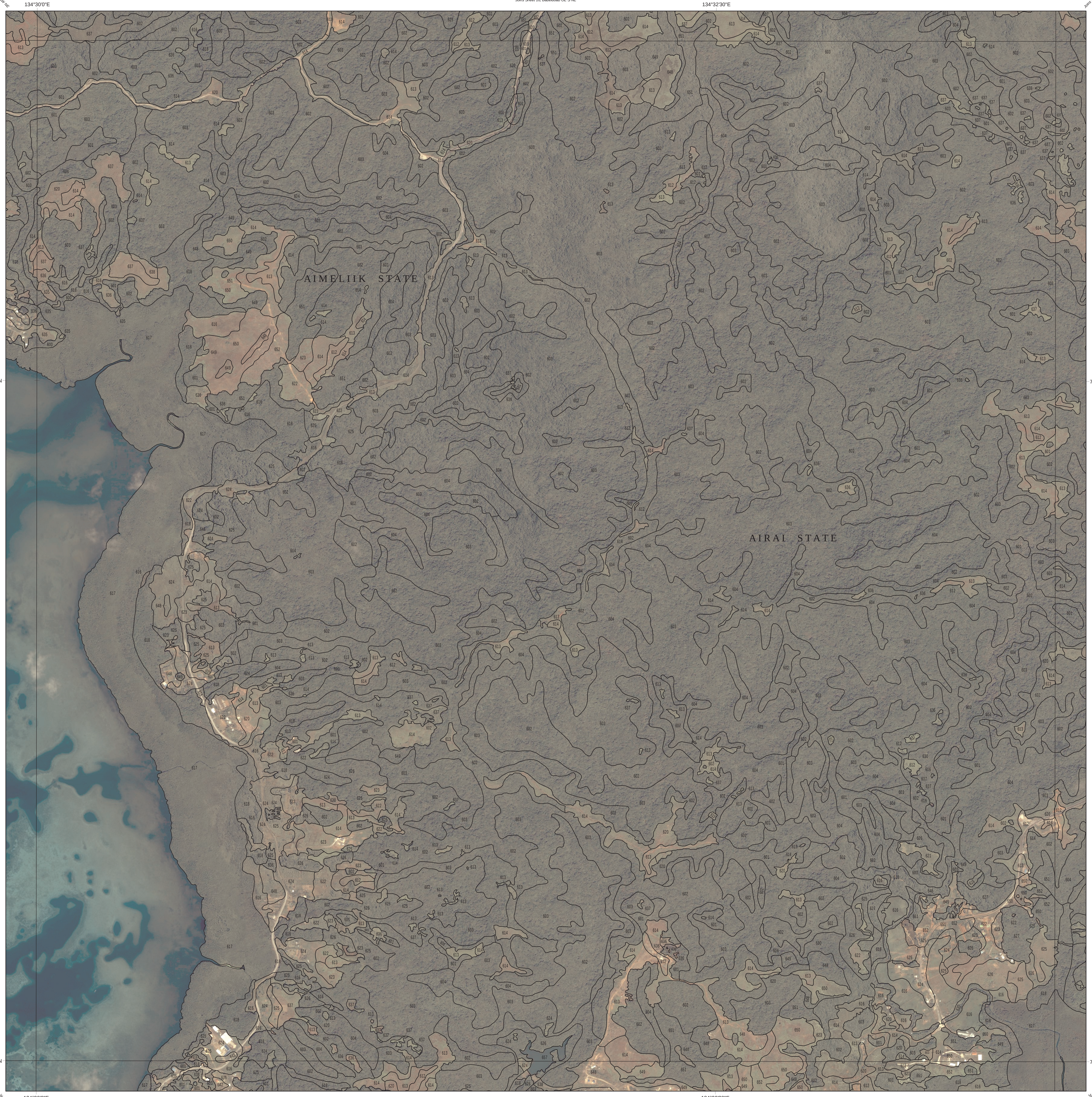
Kilometers

0 2,500 5,000

Feet

SCALE 1:12000





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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

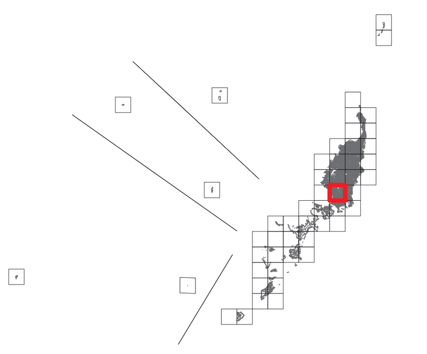
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 20 OF 49

Joins Sheet 16, Babeldaob OE S NW

Joins Sheet 17, Babeldaob OE S NE

Joins Sheet 18, Babeldaob SE NW

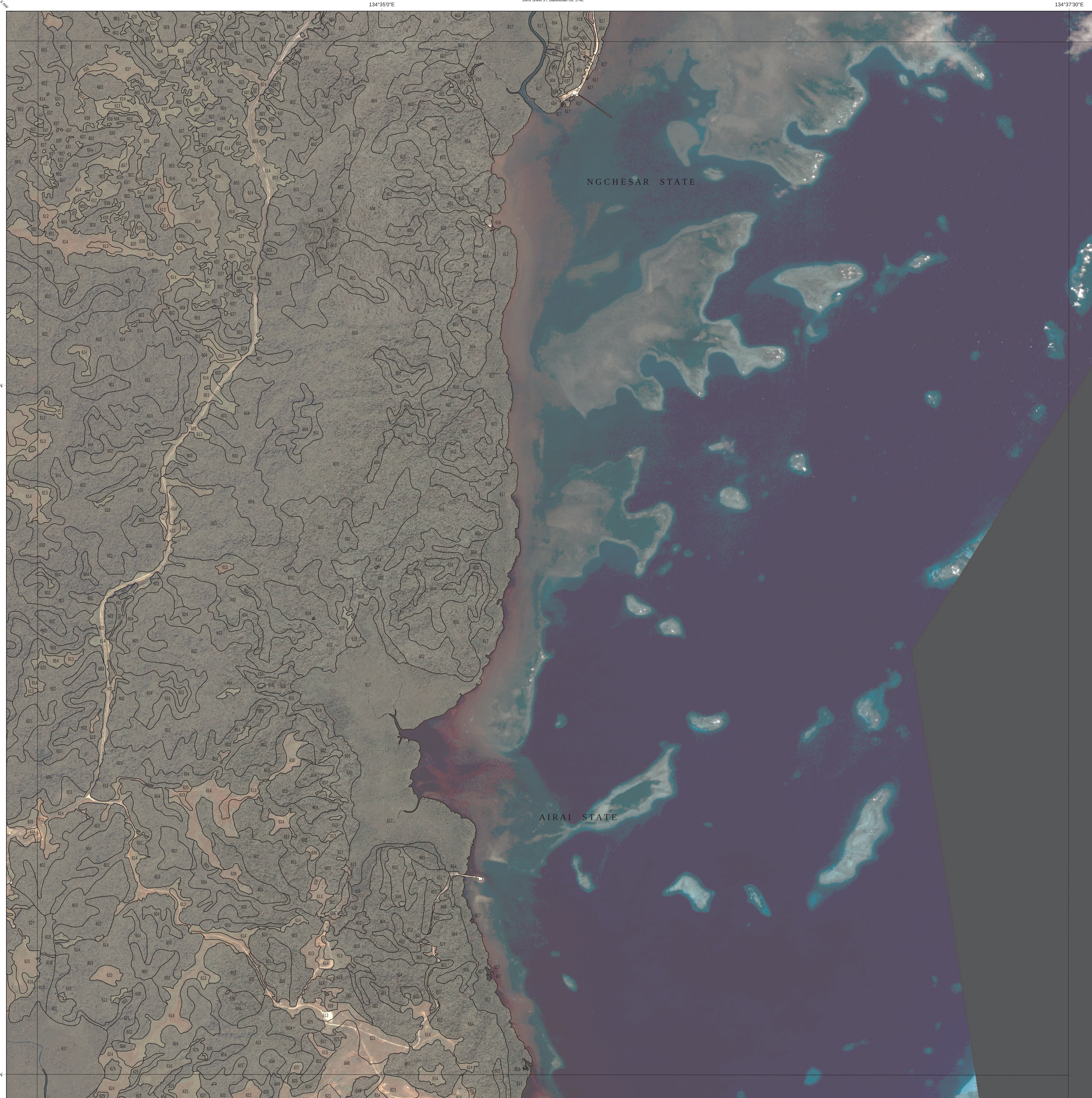
134°35'0"E

134°37'30"E

Joins Sheet 20, Babeldaob OE S SW

7°25'0"N

7°22'30"N



7°25'0"N

7°22'30"N

134°35'0"E

134°37'30"E

Joins Sheet 25, Koror OE E NE

Joins Sheet 24, Koror OE E NW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1 0.5 0 1

Miles

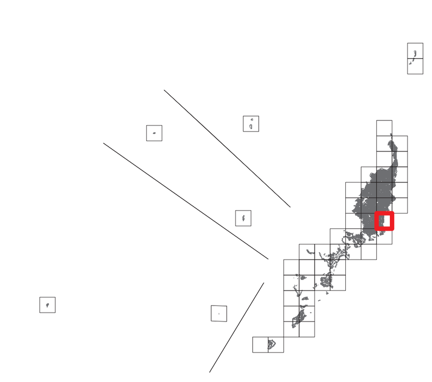
1 0.5 0 1

Kilometers

0 2,500 5,000

Feet

SCALE 1:12000



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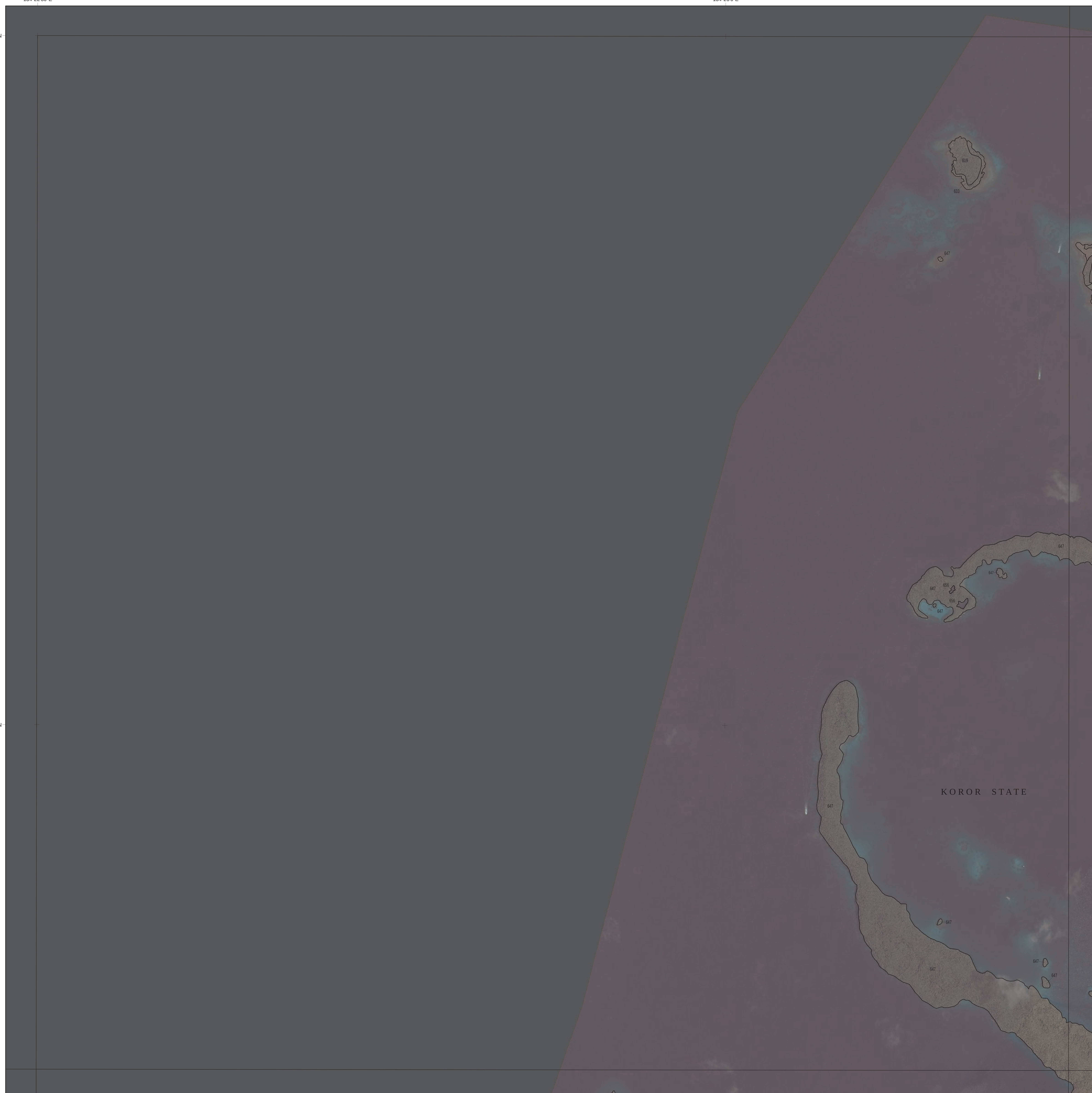
ISLANDS OF PALAU, REPUBLIC OF PALAU
KOROR NW
SHEET NUMBER 22 OF 49



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World Geographic System Datum of 1984 (WGS84).
Universal Transverse Mercator (UTM) coordinate system

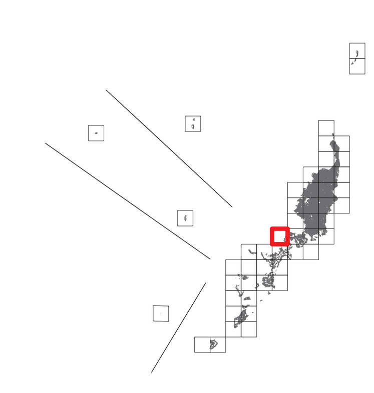
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 22 OF 49

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NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
KOROR NE
SHEET NUMBER 23 OF 49

Joins Sheet 19, Babeldoab OE SW SE

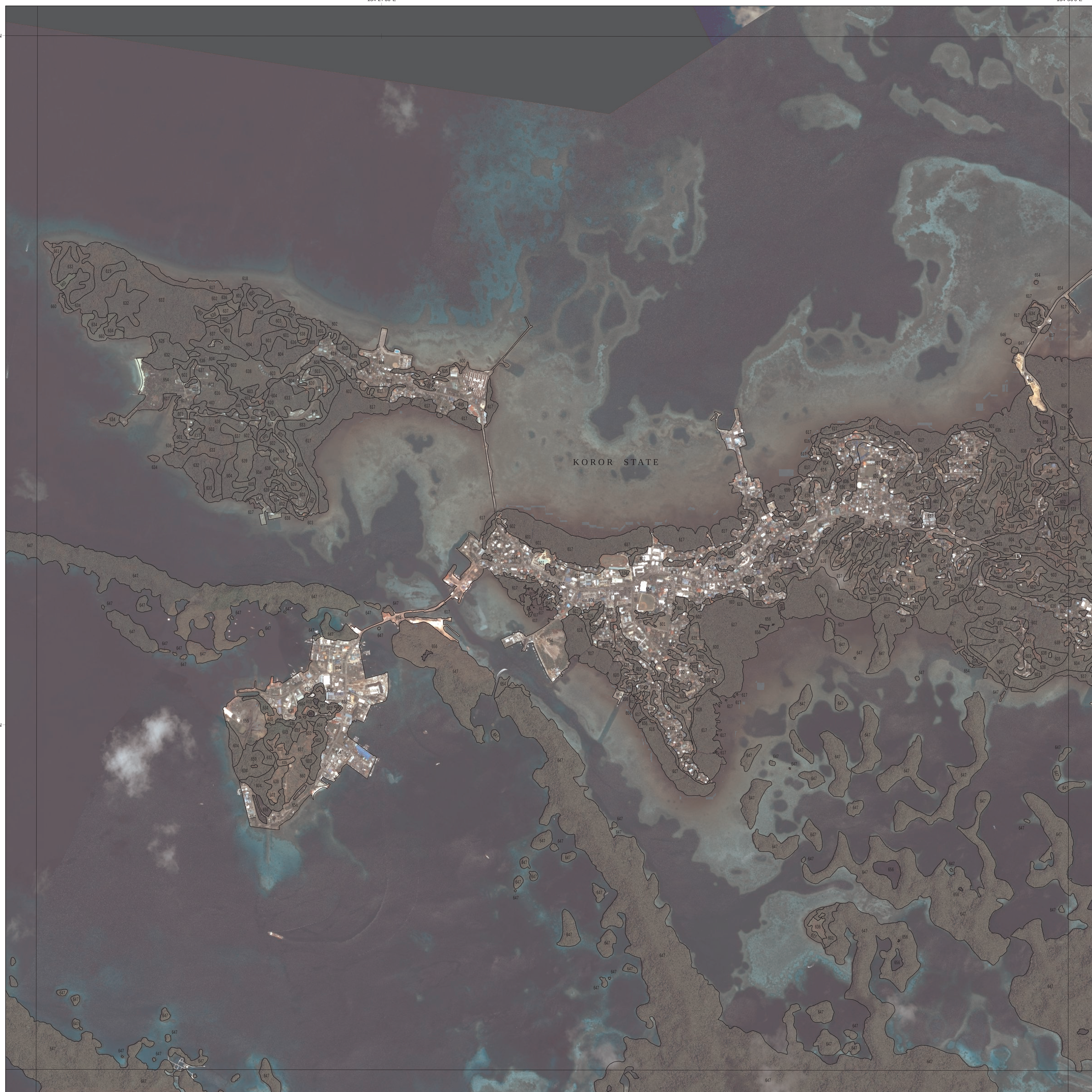
Joins Sheet 20, Babeldaob OE S SW

134°27'30"E   134°30'0"E

7°22'30"N   7°22'30"N

Joins Sheet 22, Koror NW

Joins Sheet 24, Koror OE E NW



7°20'0"N   7°20'0"N

134°27'30"E   134°30'0"E

Joins Sheet 28, Koror SW

Joins Sheet 29, Koror SE

Joins Sheet 30, Koror OE E SW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1   0.5   0   1
Miles

1   0.5   0   1
Kilometers

0   2,500   5,000
Feet

SCALE 1:12000

ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 23 OF 49

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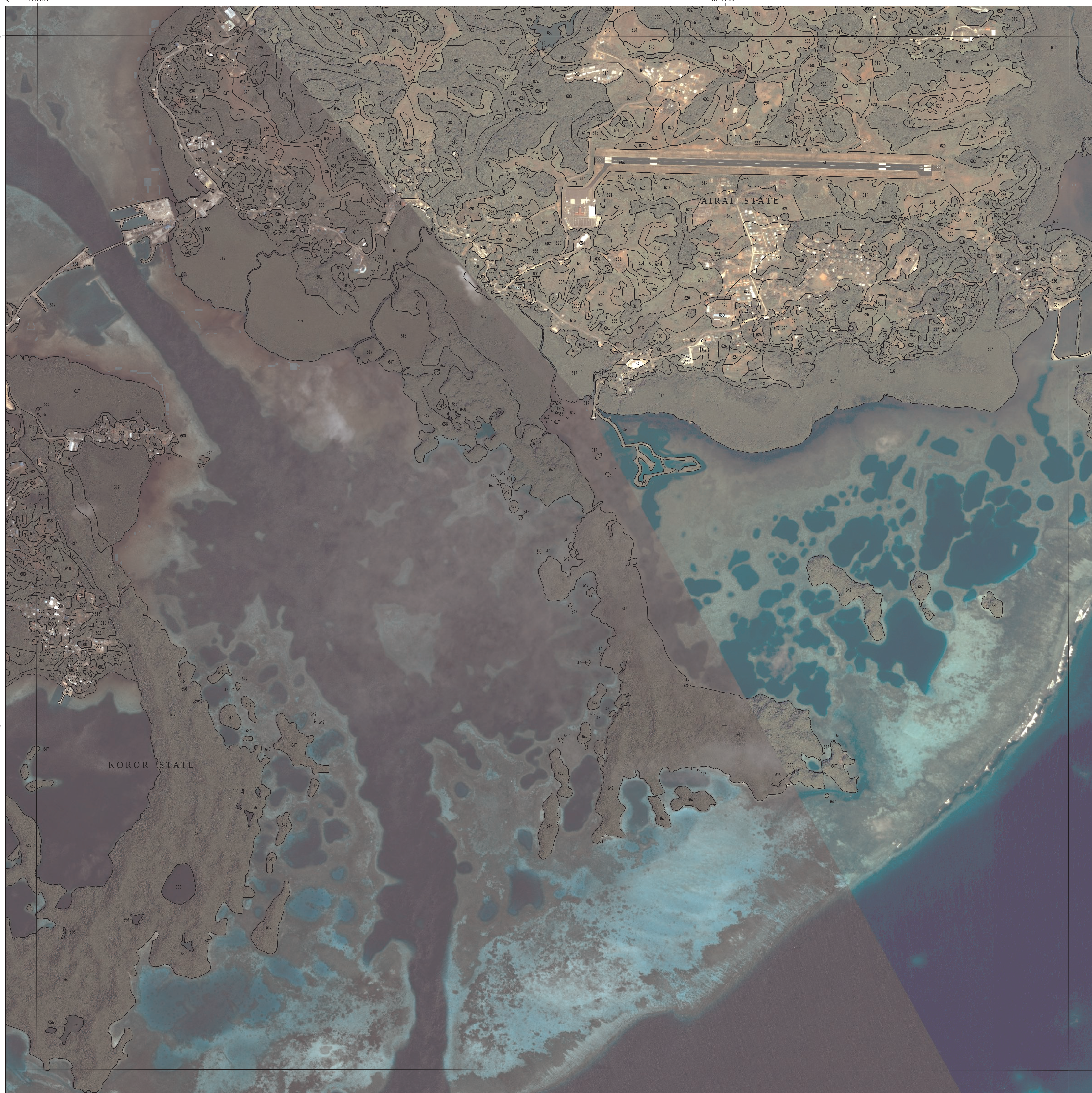
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins Sheet 20, Babeldoab OE S SW



Joins Sheet 23, Koror NE
Joins Sheet 25, Koror OE E NE
Joins Sheet 30, Koror OE E SW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

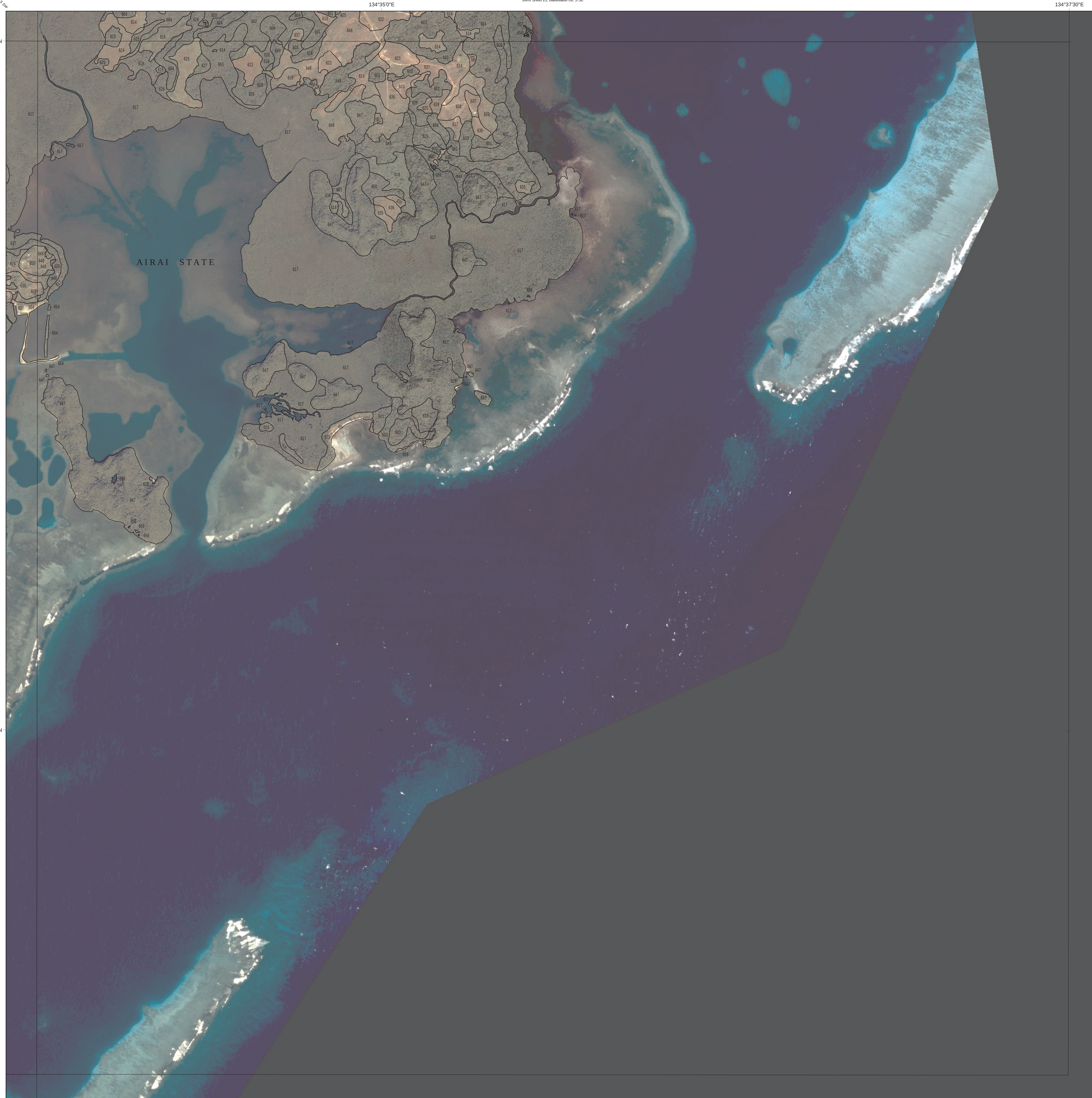
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



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Universal Transverse Mercator (UTM) coordinate system

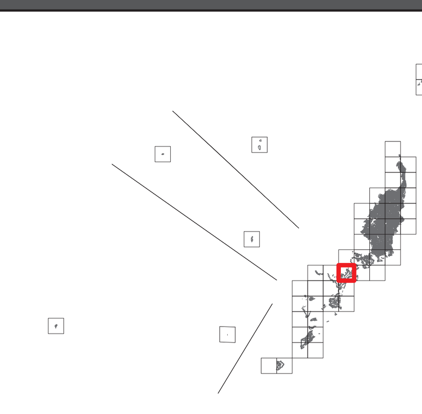
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

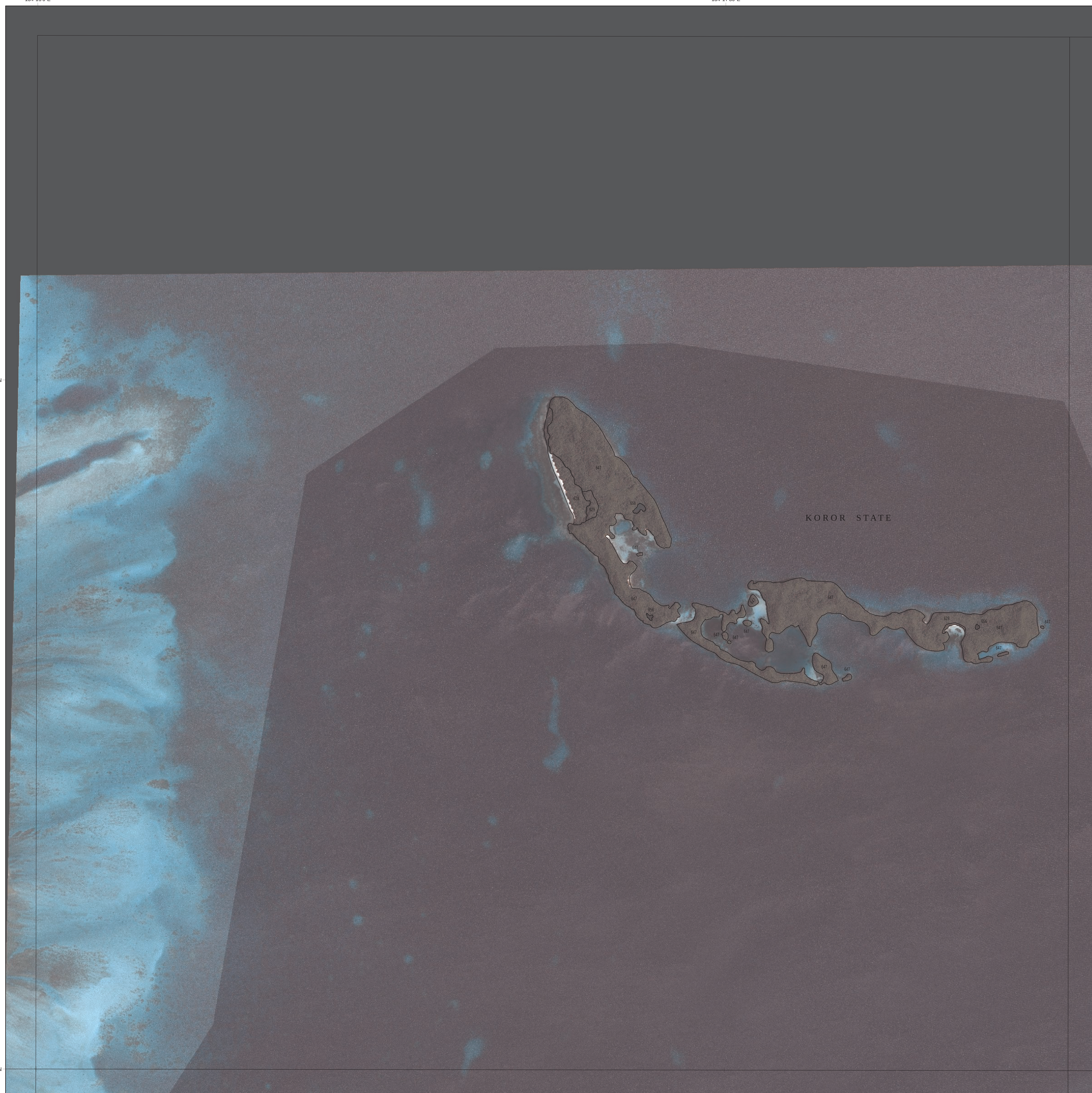
0 2,500 5,000
Feet

SCALE 1:12000



134°15'0"E 134°17'30"E

7°17'30"N 7°17'30"N



7°15'0"N 7°15'0"N

134°15'0"E 134°17'30"E

Joins Sheet 31, Eil Malk OE W NE

Joins Sheet 32, Eil Malk NW

Joins Sheet 33, Eil Malk NE

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Universal Transverse Mercator (UTM) coordinate system

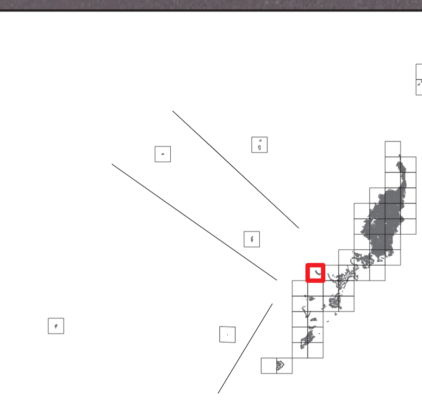
N

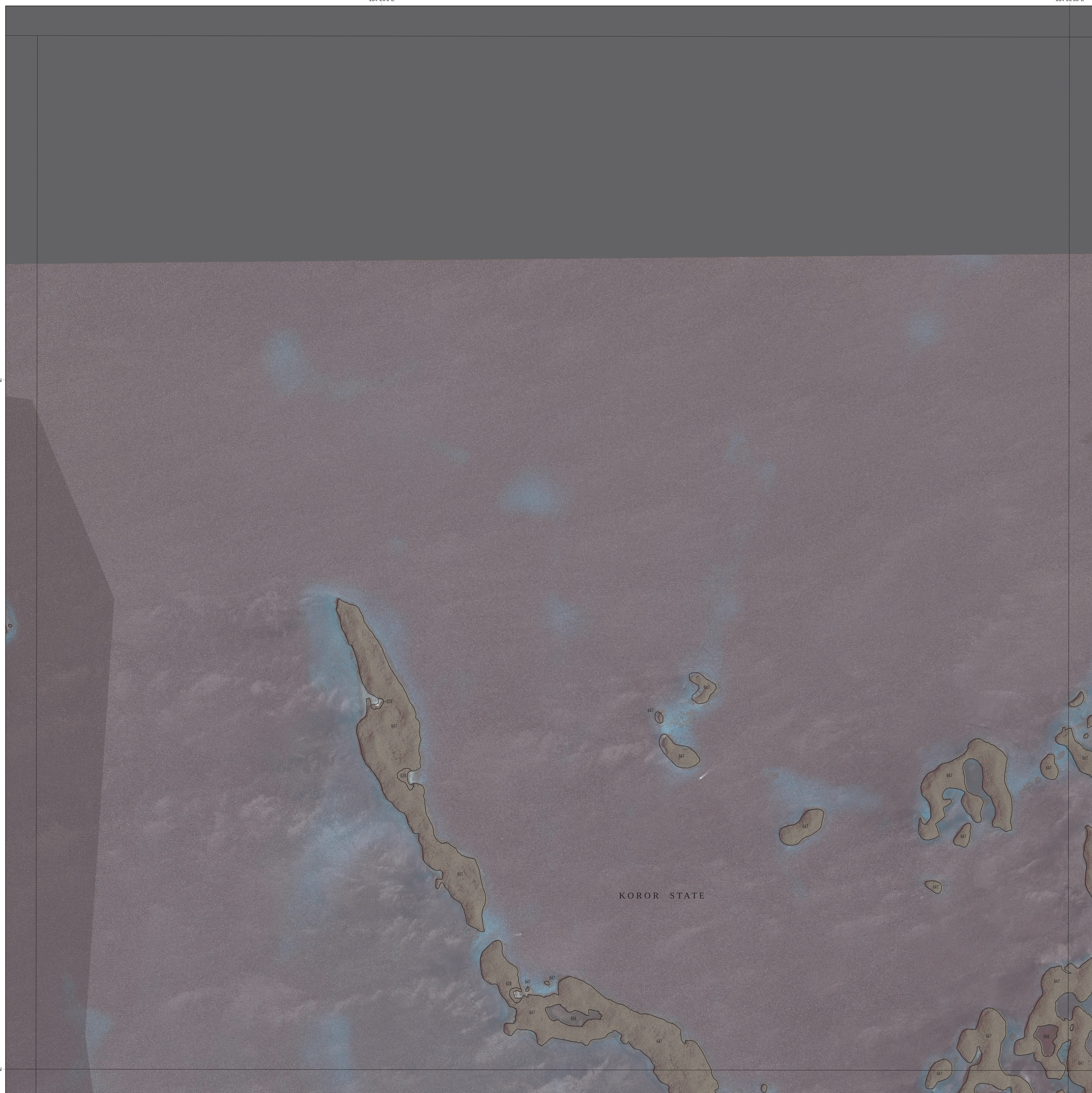
1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000





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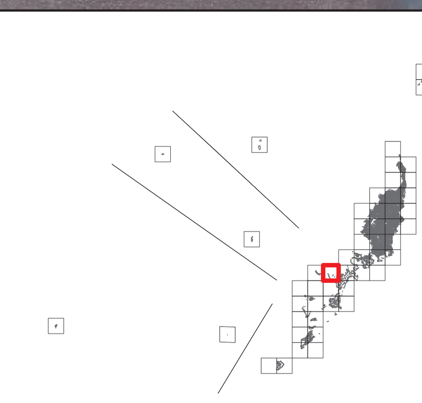
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



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NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
KOROR SW
SHEET NUMBER 28 OF 49

Joins Sheet 22, Koror NW

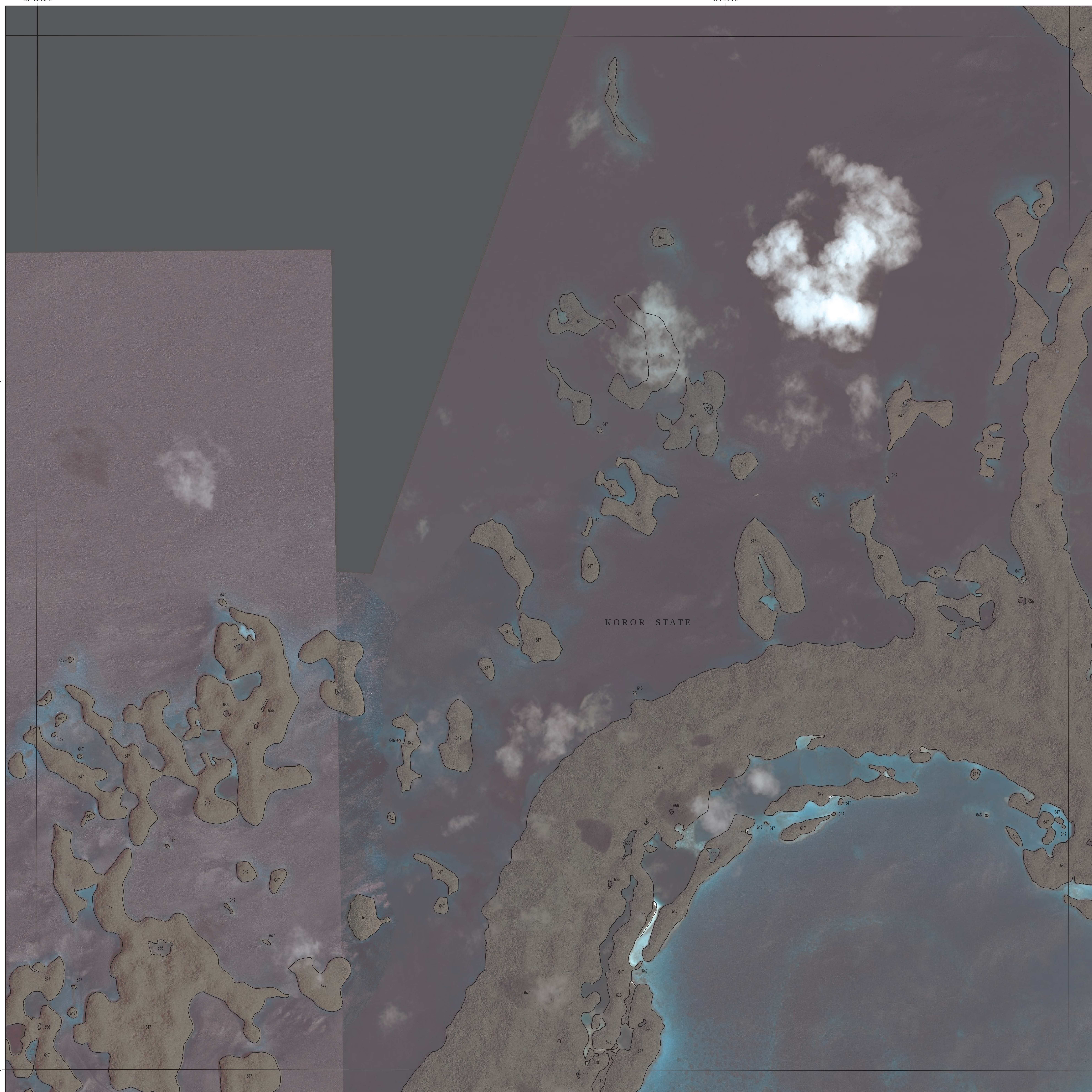
Joins Sheet 23, Koror NE

134°22'30"E 134°25'0"E

7°17'30"N

Joins Sheet 27, Ulong SE

Joins Sheet 29, Koror SE



7°15'0"N

134°22'30"E 134°25'0"E

Joins Sheet 33, Eil Malk NE

Joins Sheet 34, Koror OE S NW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

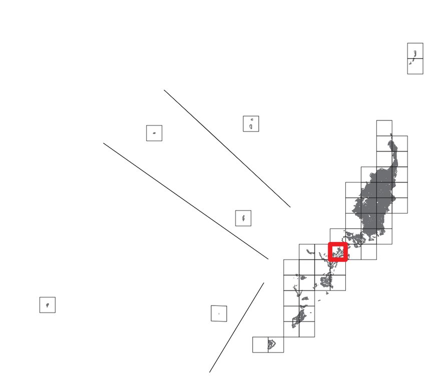
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

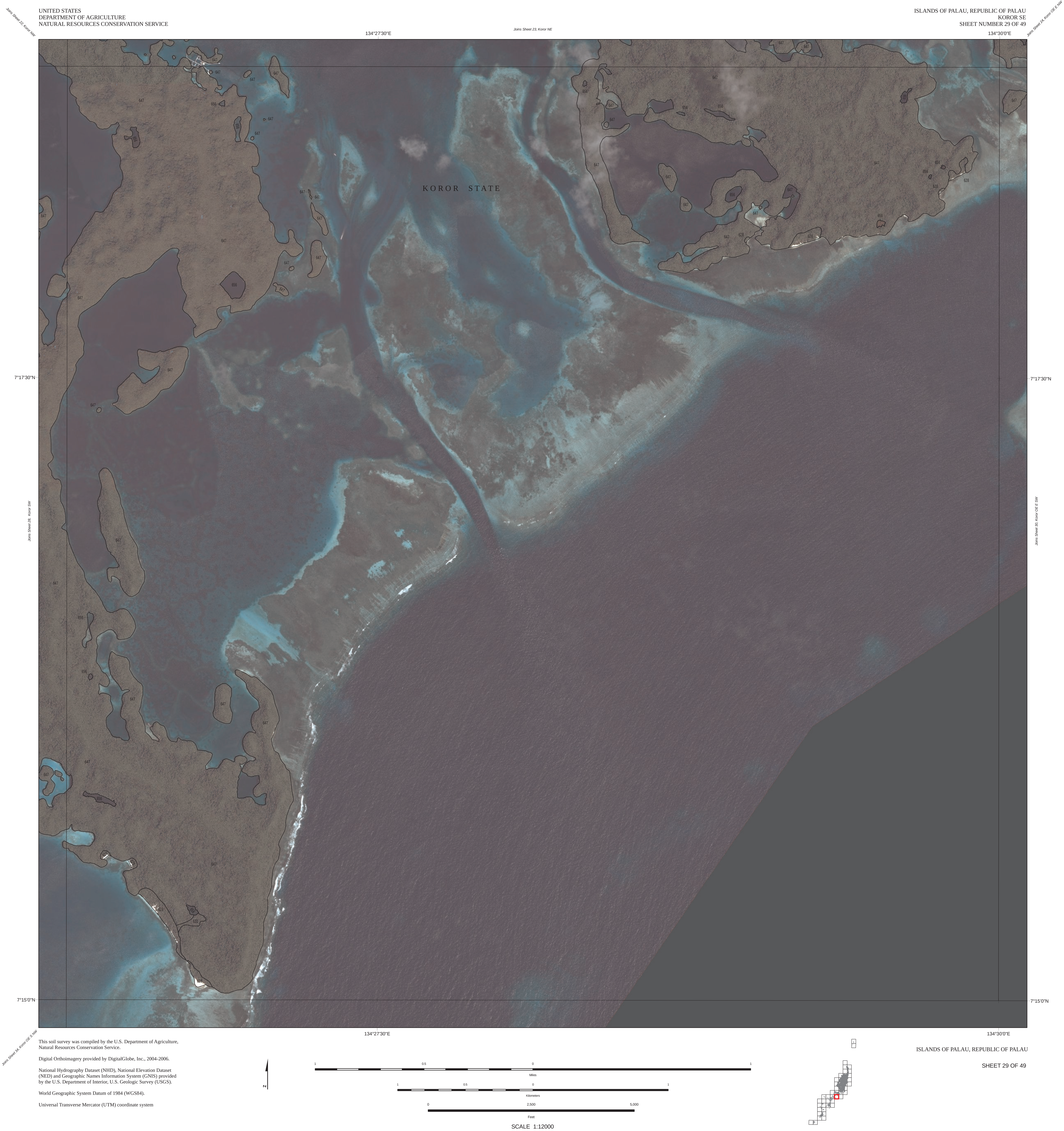
0 2,500 5,000
Feet

SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 28 OF 49



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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

SCALE 1:12000

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
KOROR OE E SW
SHEET NUMBER 30 OF 49

Joins Sheet 23, Koror NE

Joins Sheet 24, Koror OE E NW

Joins Sheet 25, Koror OE E NE

Joins Sheet 29, Koror SE

134°30'0"E

134°32'30"E

7°17'30"N

7°17'30"N

7°15'0"N

7°15'0"N

134°30'0"E

134°32'30"E

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

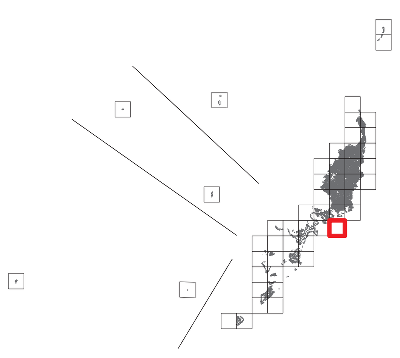
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



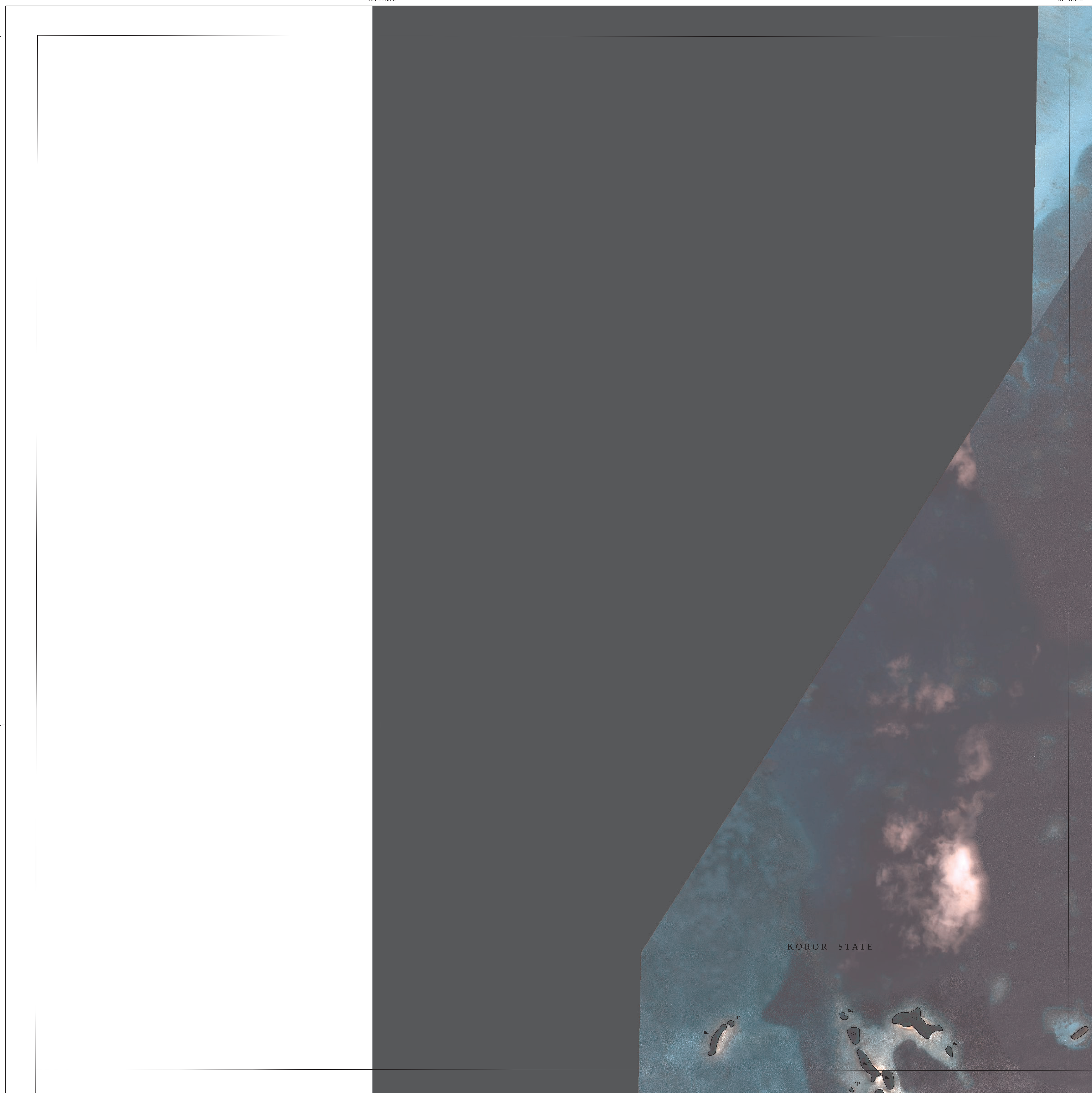
ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 30 OF 49

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
EIL MALK OE W NE
SHEET NUMBER 31 OF 49

Joins Sheet 28, Ulong SW



Joins Sheet 32, Eil Malk NW

Joins Sheet 35, Eil Malk OE W SE

Joins Sheet 36, Eil Malk SW

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins Sheet 26, Ulong SW

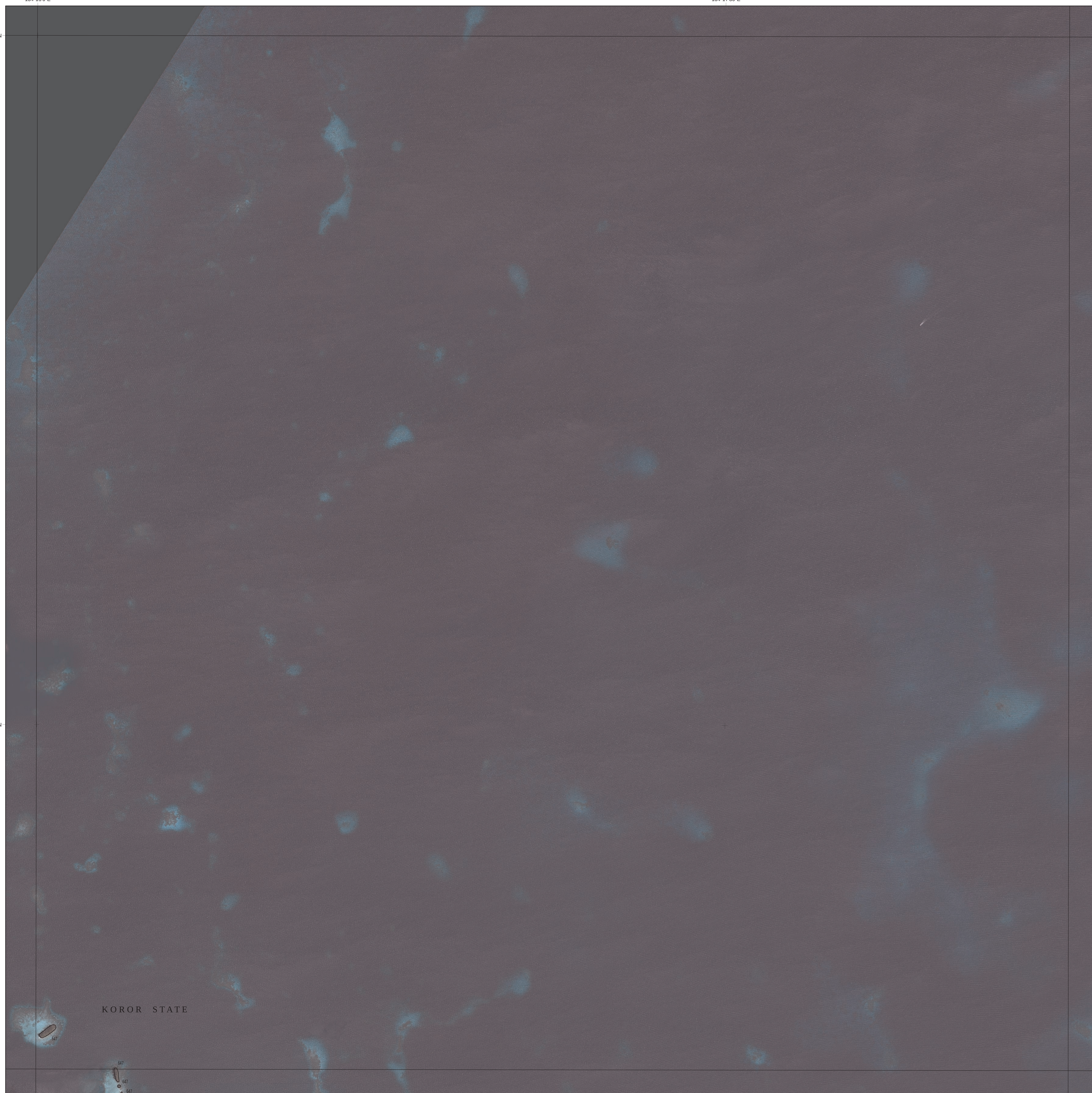
Joins Sheet 27, Ulong SE

134°15'0"E 134°17'30"E

7°15'0"N

Joins Sheet 31, Eil Malk OE W NE

Joins Sheet 33, Eil Malk NE



7°12'30"N

134°15'0"E 134°17'30"E

Joins Sheet 35, Eil Malk OE W SE

Joins Sheet 36, Eil Malk SW

Joins Sheet 37, Eil Malk SE

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

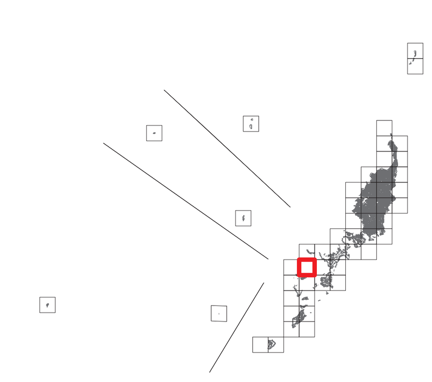
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



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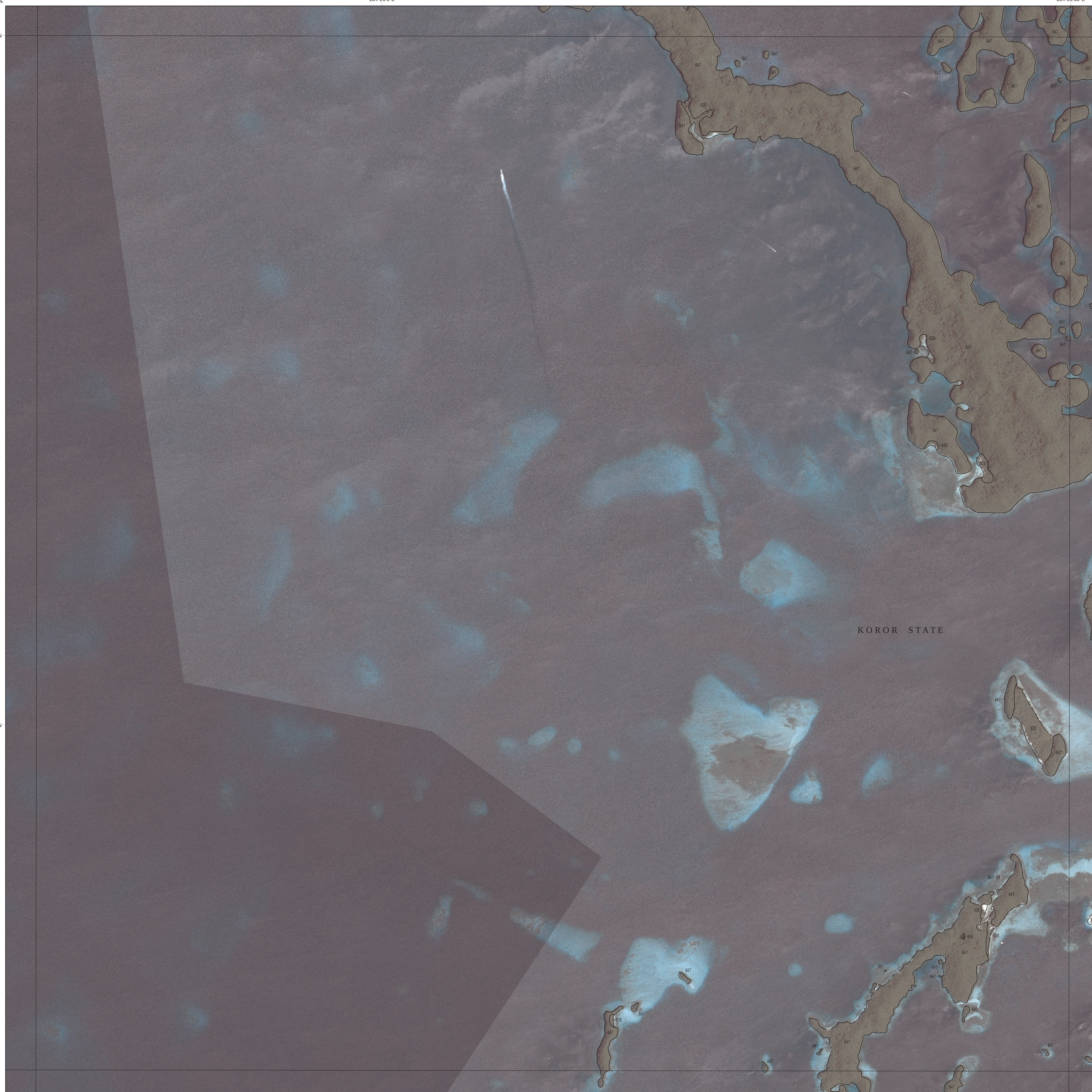
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
EIL MALK NE
SHEET NUMBER 33 OF 49

134°20'0"E
134°22'30"E

7°15'0"N
7°12'30"N

Joins Sheet 32, Eil Malk NW



Joins Sheet 34, Koror OE S NW

134°20'0"E
134°22'30"E

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

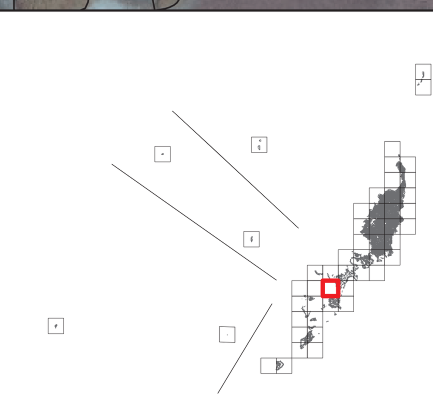
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 33 OF 49

UNITED STATES
DEPARTMENT OF AGRICULTURE
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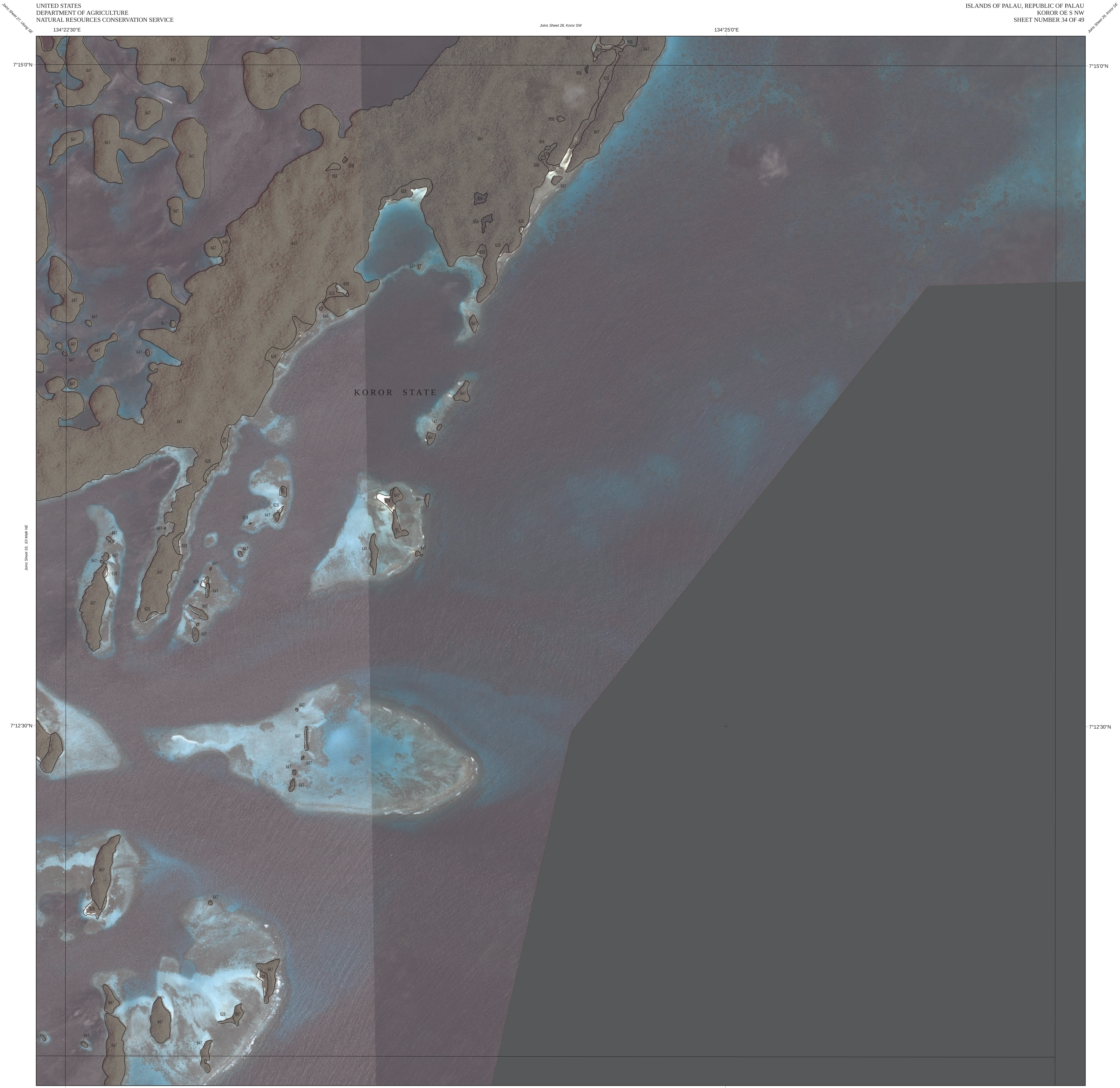

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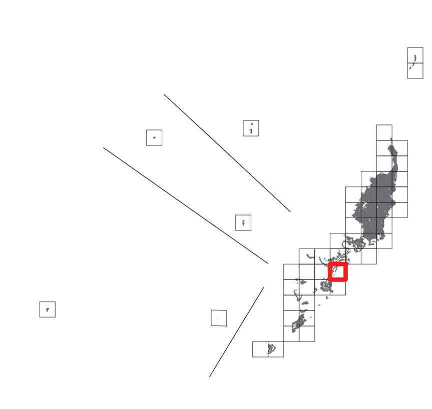
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



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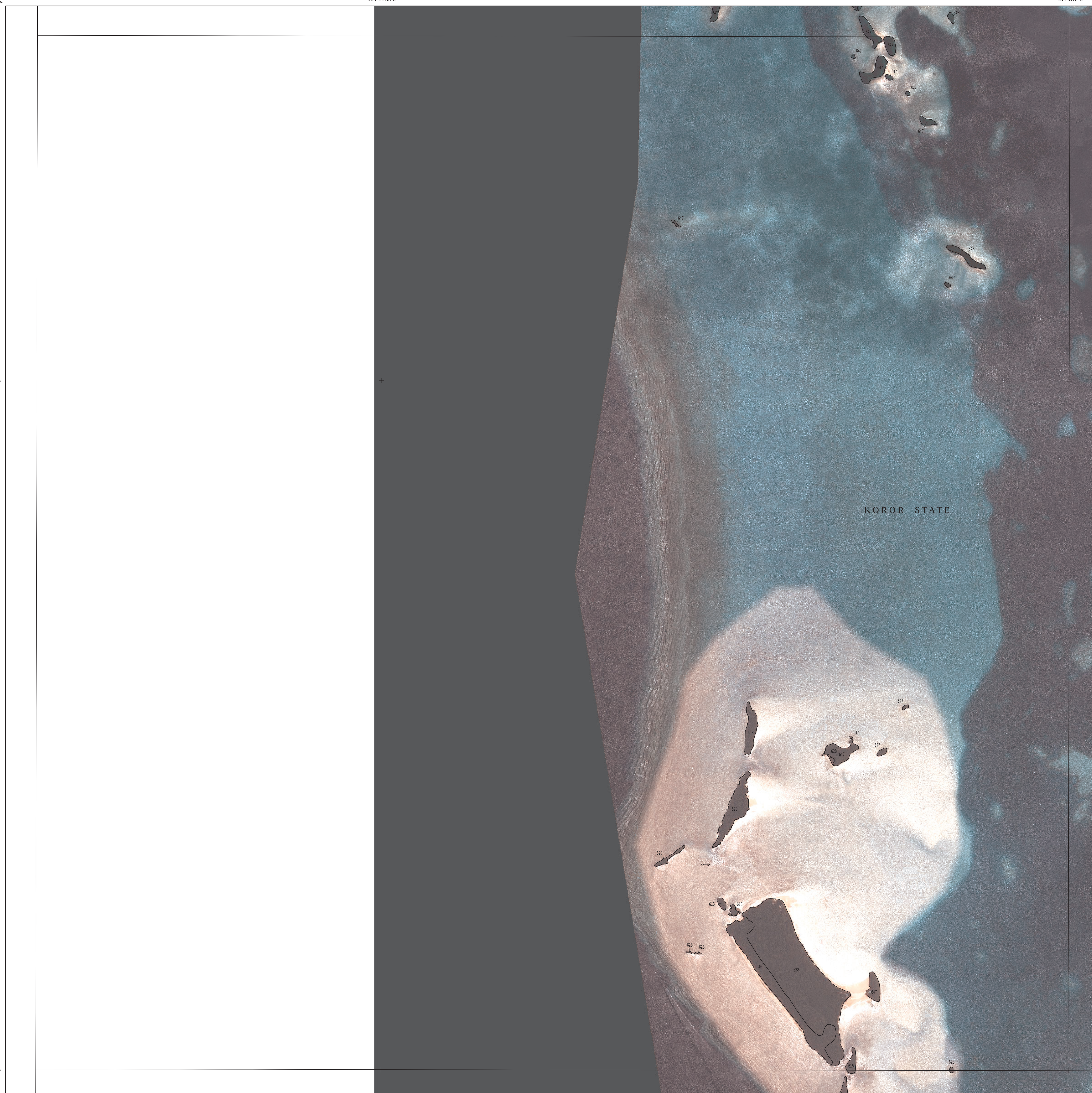

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

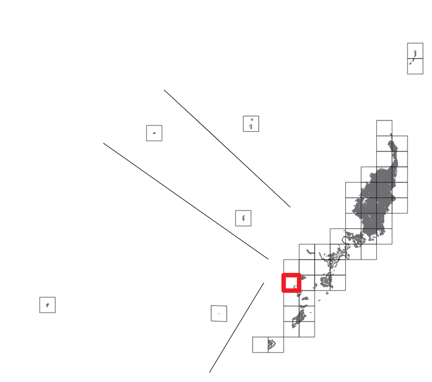
N

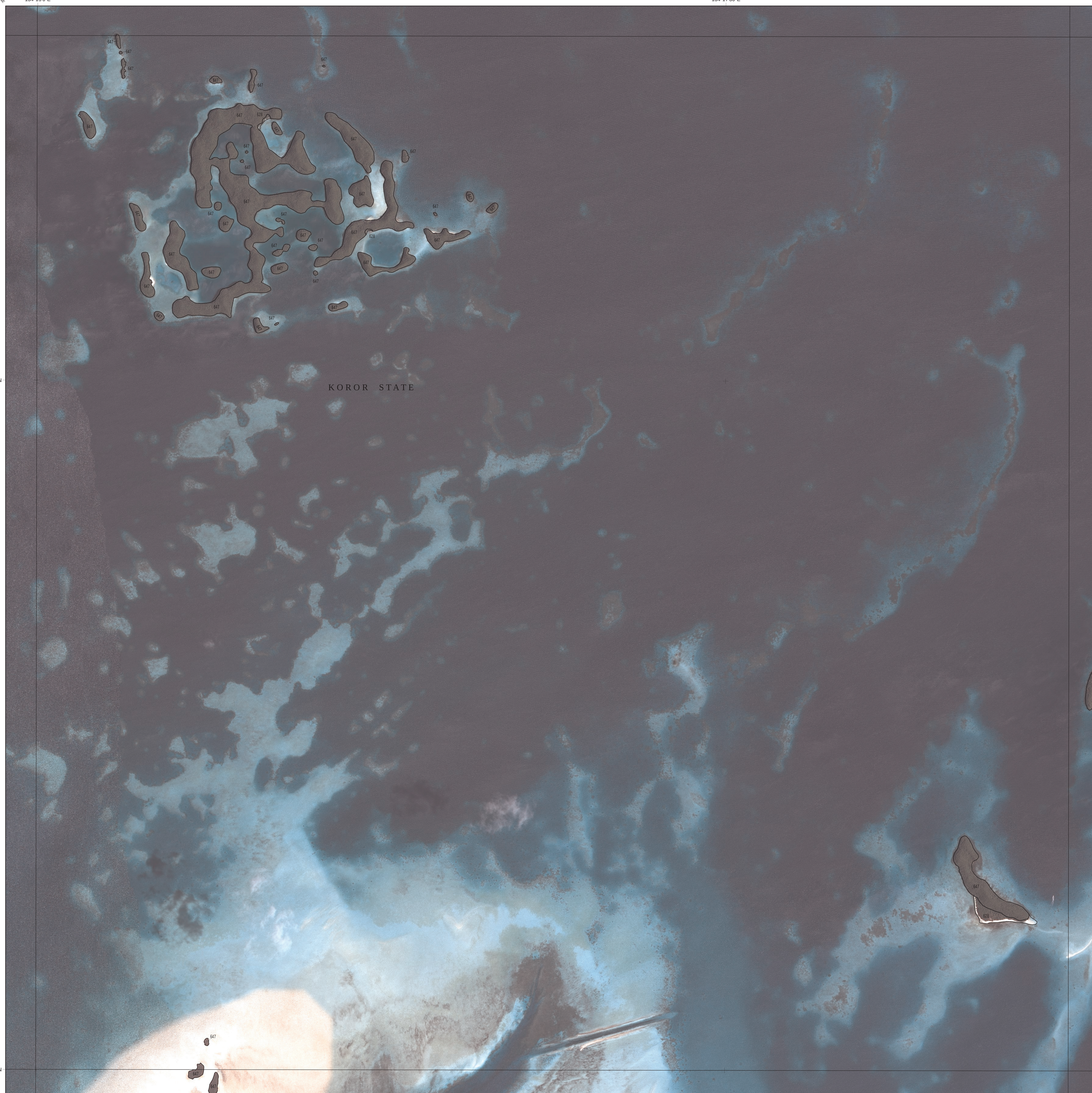
1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000





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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

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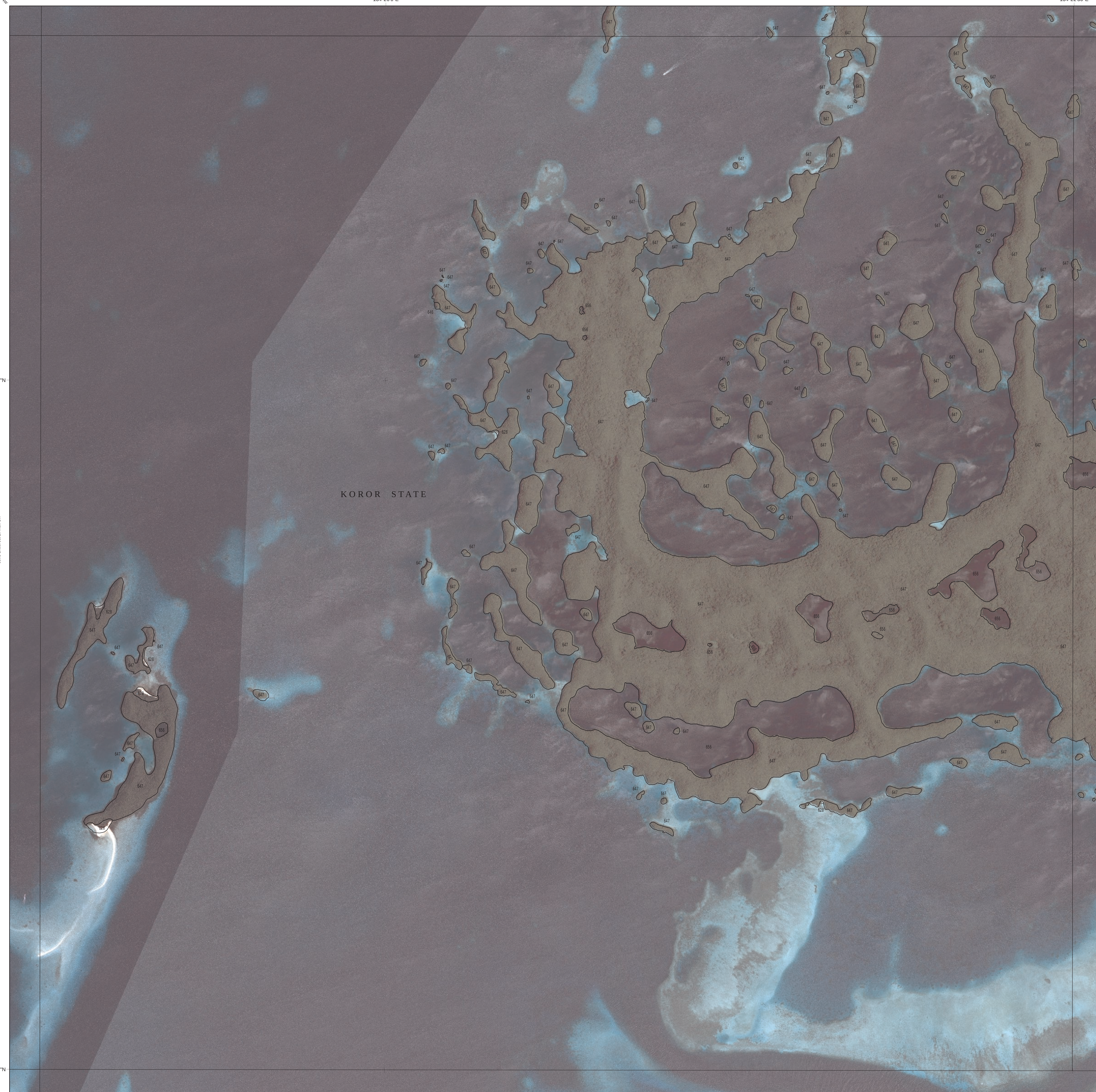
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ISLANDS OF PALAU, REPUBLIC OF PALAU
EIL MALK SE
SHEET NUMBER 37 OF 49



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Universal Transverse Mercator (UTM) coordinate system

N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 37 OF 49

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DEPARTMENT OF AGRICULTURE
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ISLANDS OF PALAU, REPUBLIC OF PALAU
KOROR OE S SW
SHEET NUMBER 38 OF 49

Joins Sheet 33, Eil Malk NE

Joins Sheet 34, Koror OE S NW

Joins Sheet 33, Eil Malk NE

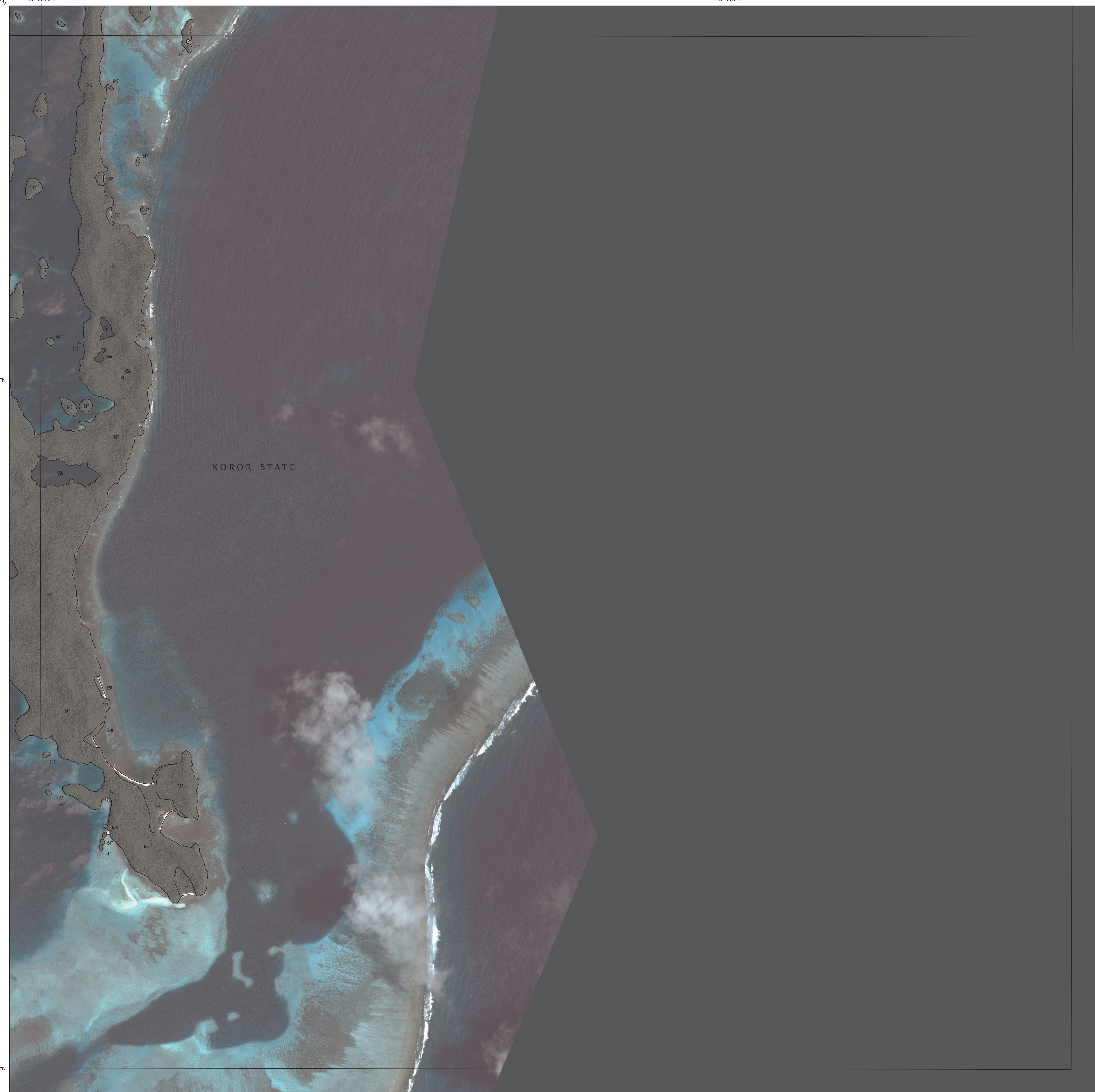
Joins Sheet 37, Eil Malk SE

134°22'30"E

134°25'0"E

7°10'0"N

7°7'30"N



134°22'30"E

134°25'0"E

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World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system

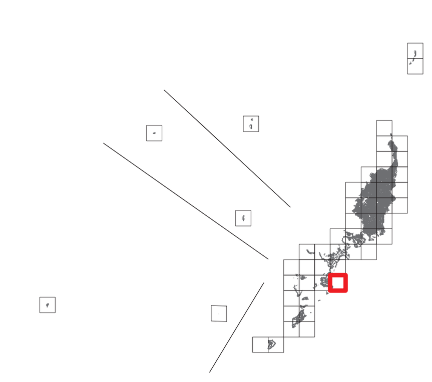
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

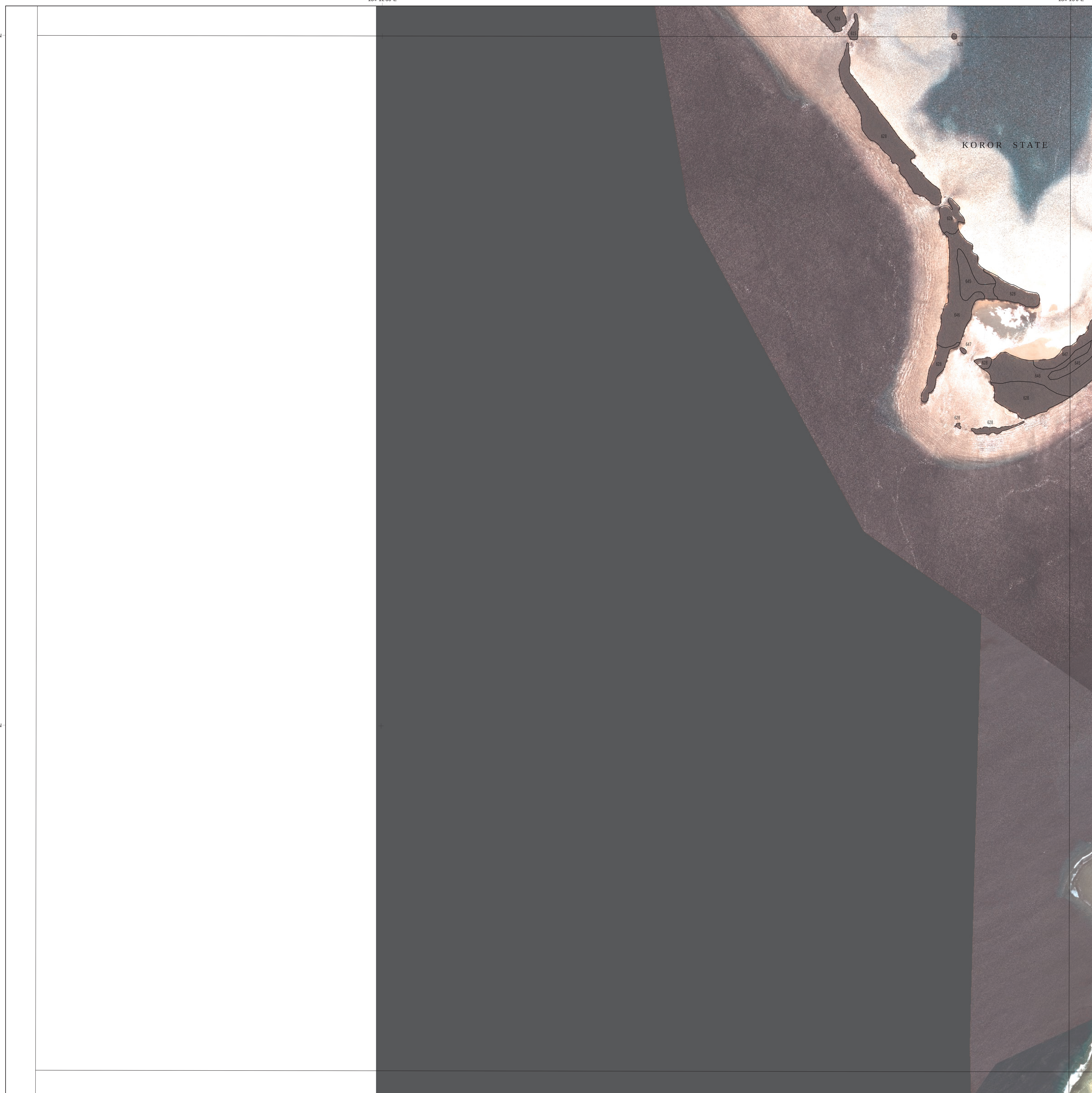
SCALE 1:12000



ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 38 OF 49

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000

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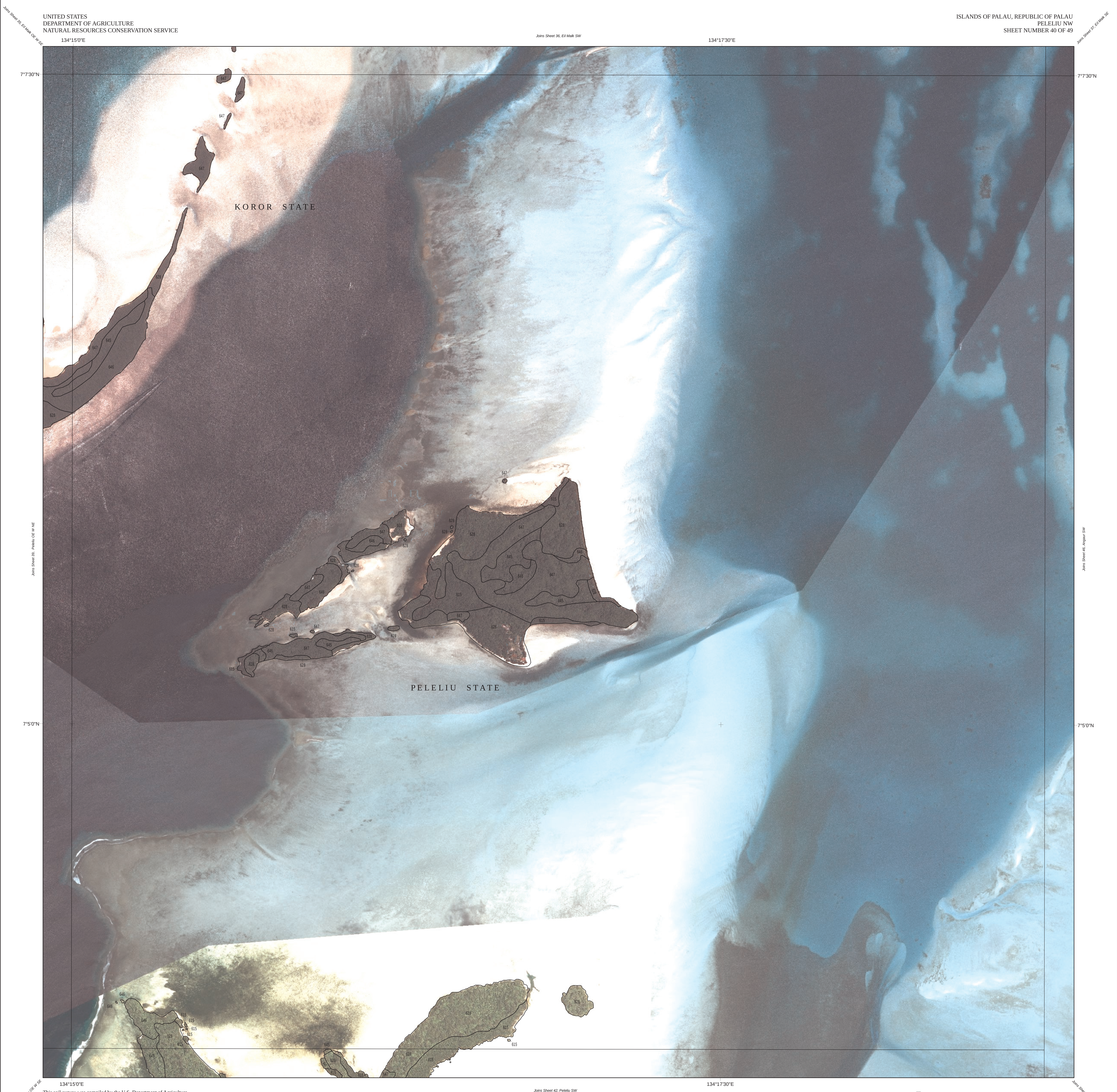
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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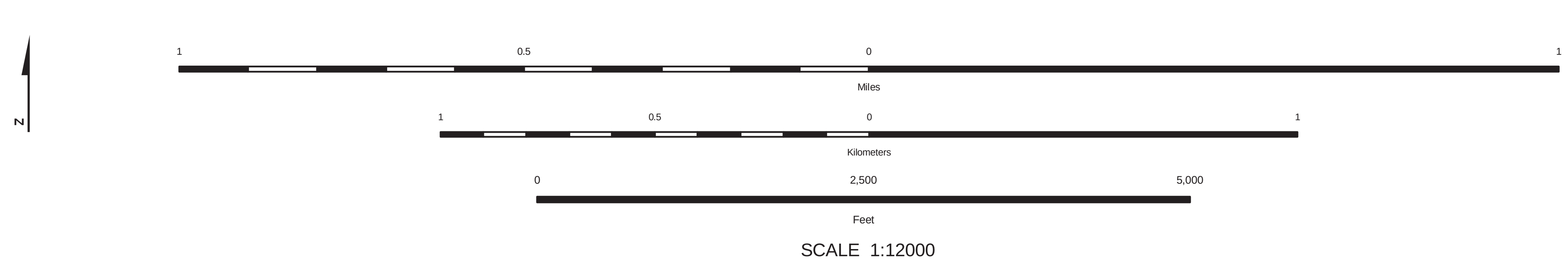
World Geographic System Datum of 1984 (WGS84).

Universal Transverse Mercator (UTM) coordinate system



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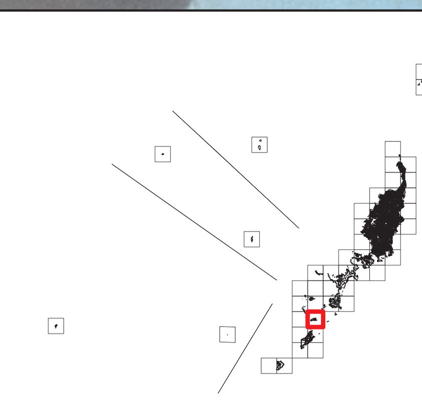

Joins Sheet 39, Peleliu OE W NE

134°12'30"E

134°15'0"E

Joins Sheet 34, Koror OE S SW

7°2'30"N

7°0'0"N

Joins Sheet

Joins Sheet 42, Peleliu SW

134°12'30"E

134°15'0"E

Joins Sheet 43, Angaur NE

Joins Sheet 44, Peleliu S NW

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Universal Transverse Mercator (UTM) coordinate system

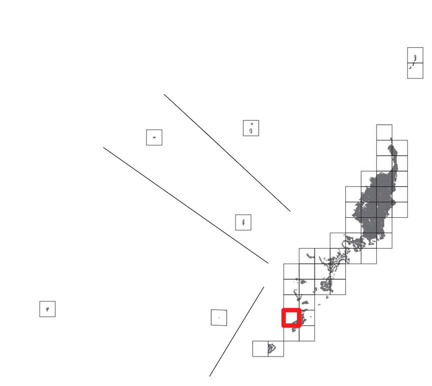
N

1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000



UNITED STATES
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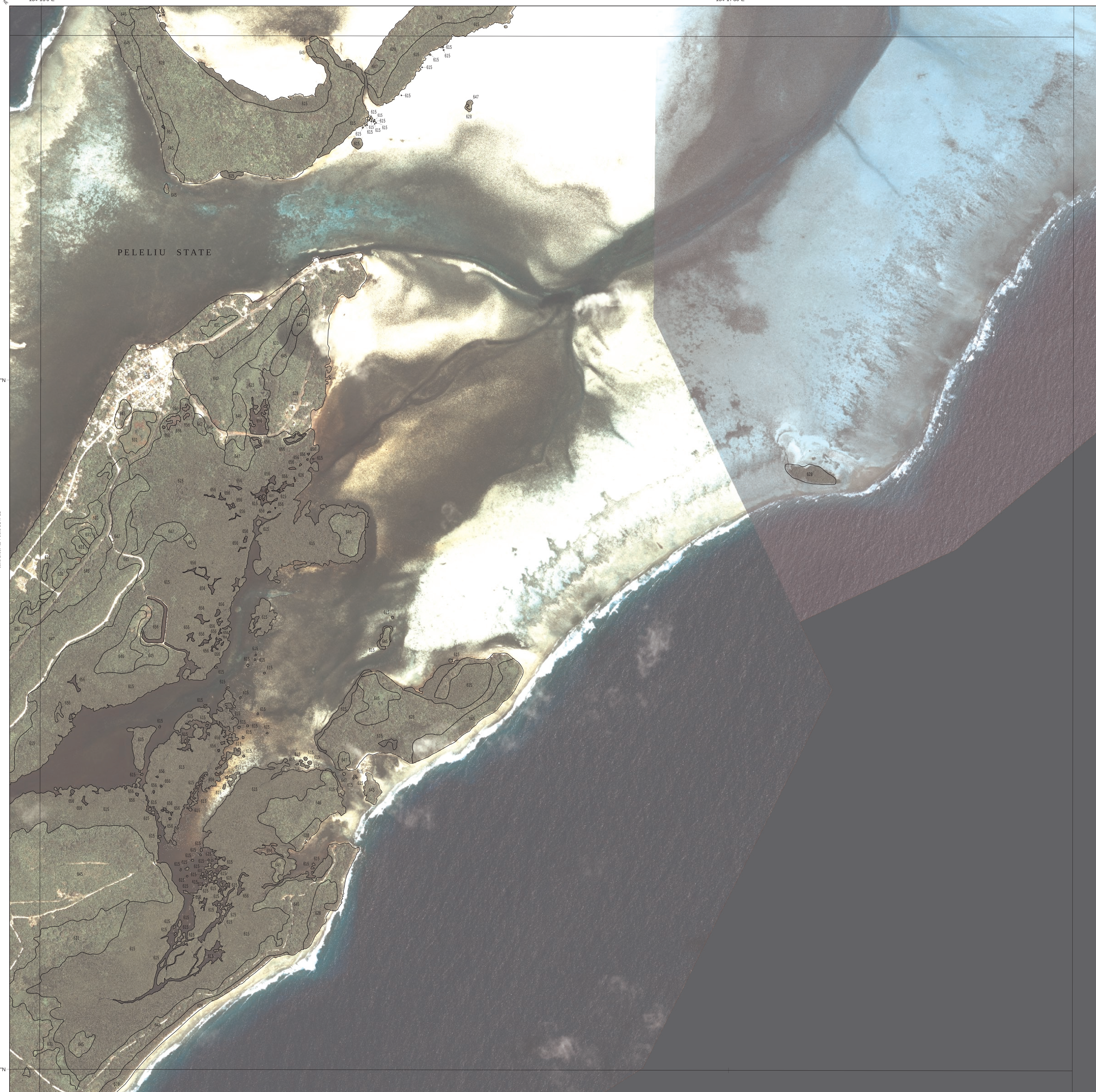

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1 0.5 0 1
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1 0.5 0 1
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0 2,500 5,000
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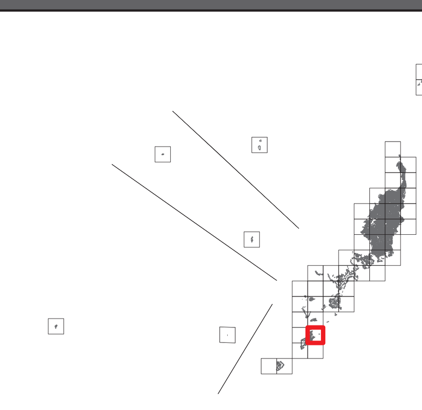
SCALE 1:12000



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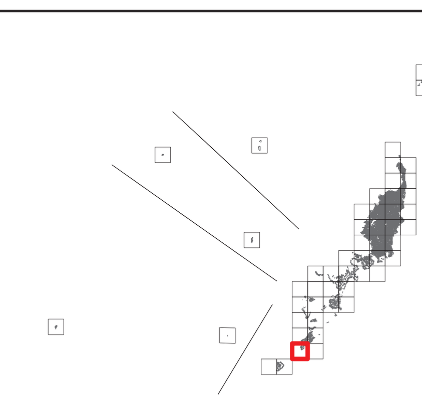
N

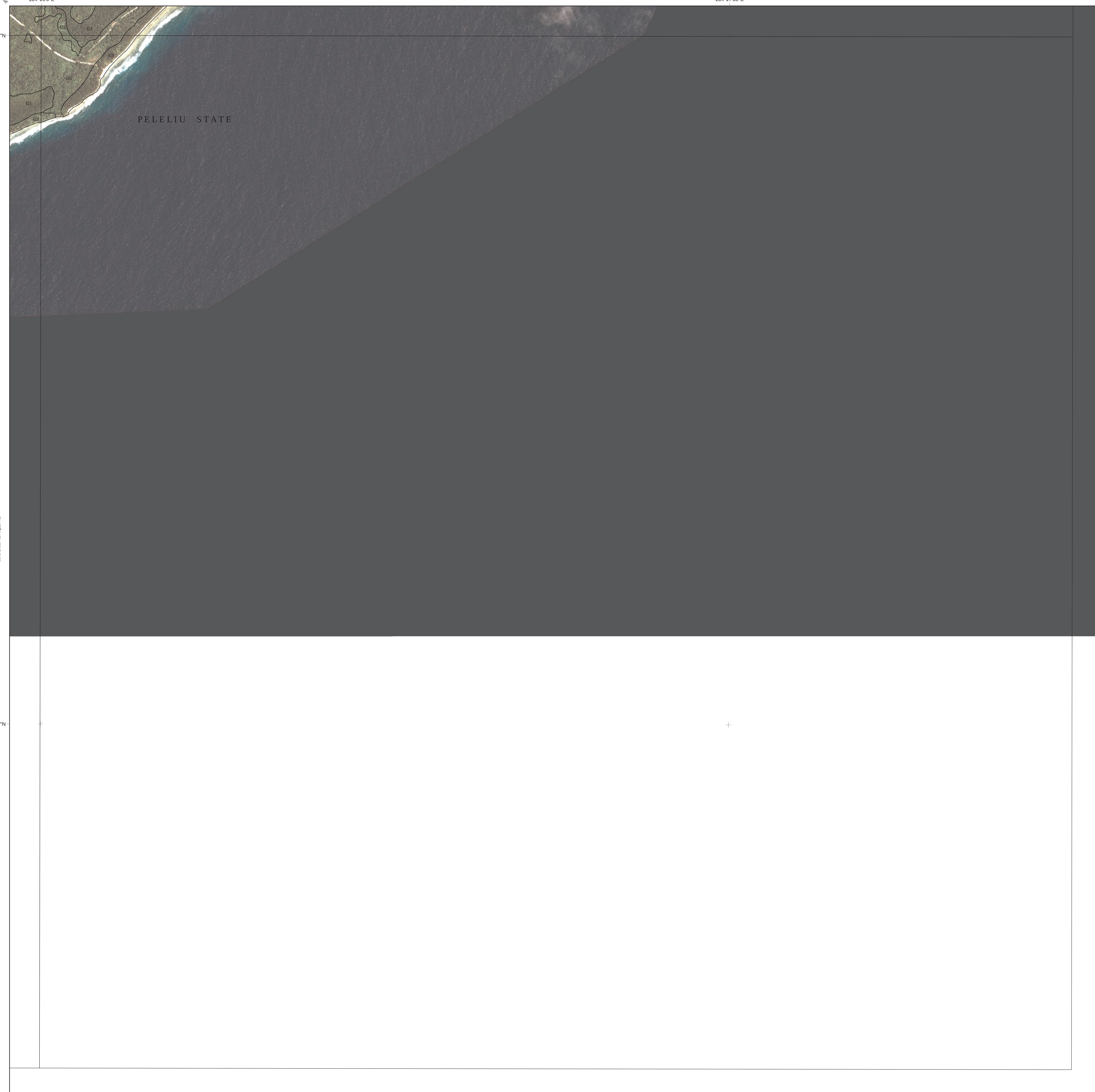
Miles: 1 — 0.5 — 0 — 1

Kilometers: 1 — 0.5 — 0 — 1

Feet: 0 — 2,500 — 5,000

SCALE 1:12000





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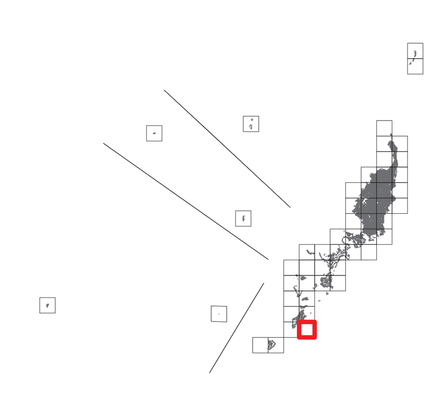
Miles: 1 — 0.5 — 0 — 1

Kilometers: 1 — 0.5 — 0 — 1

Feet: 0 — 2,500 — 5,000

SCALE 1:12000



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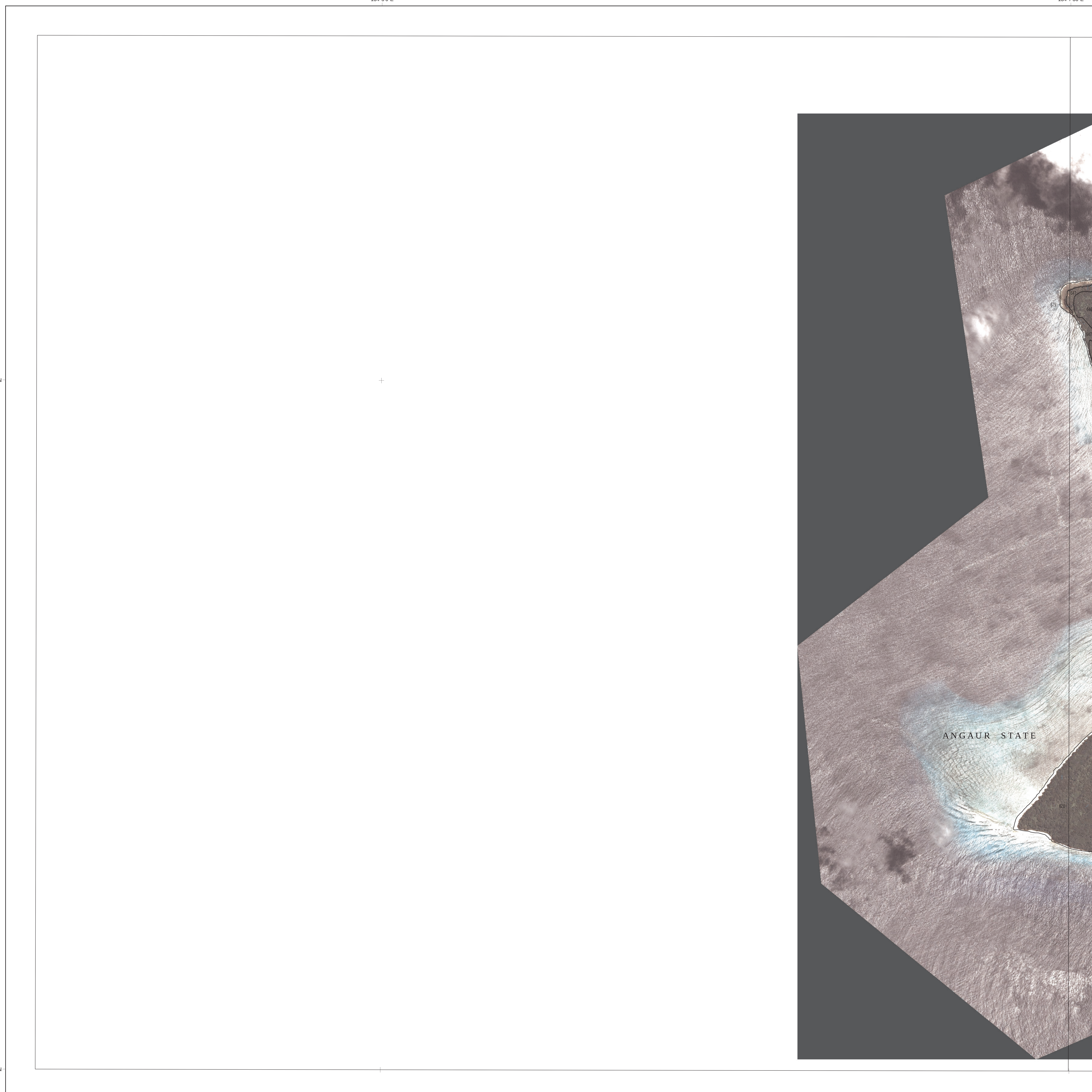

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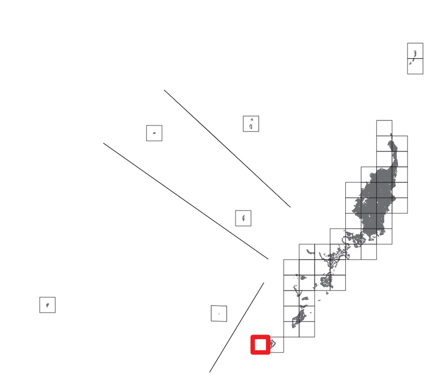
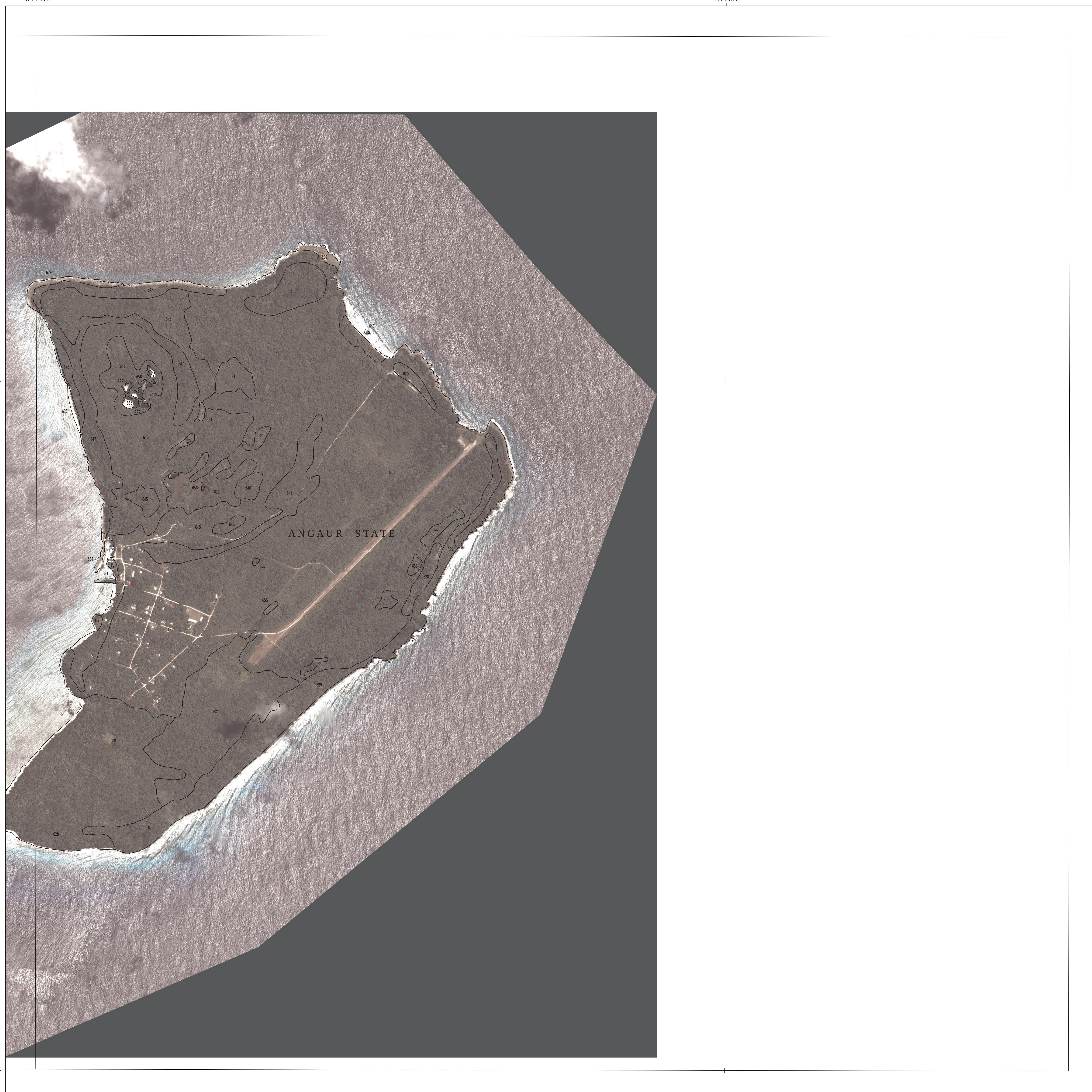
1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:12000





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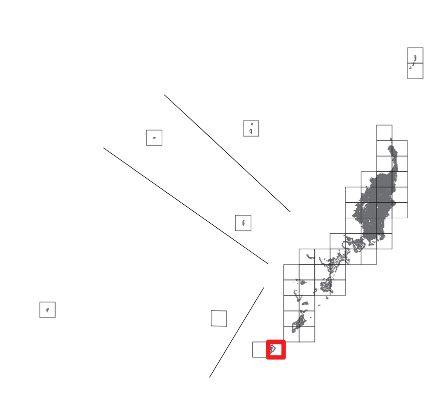

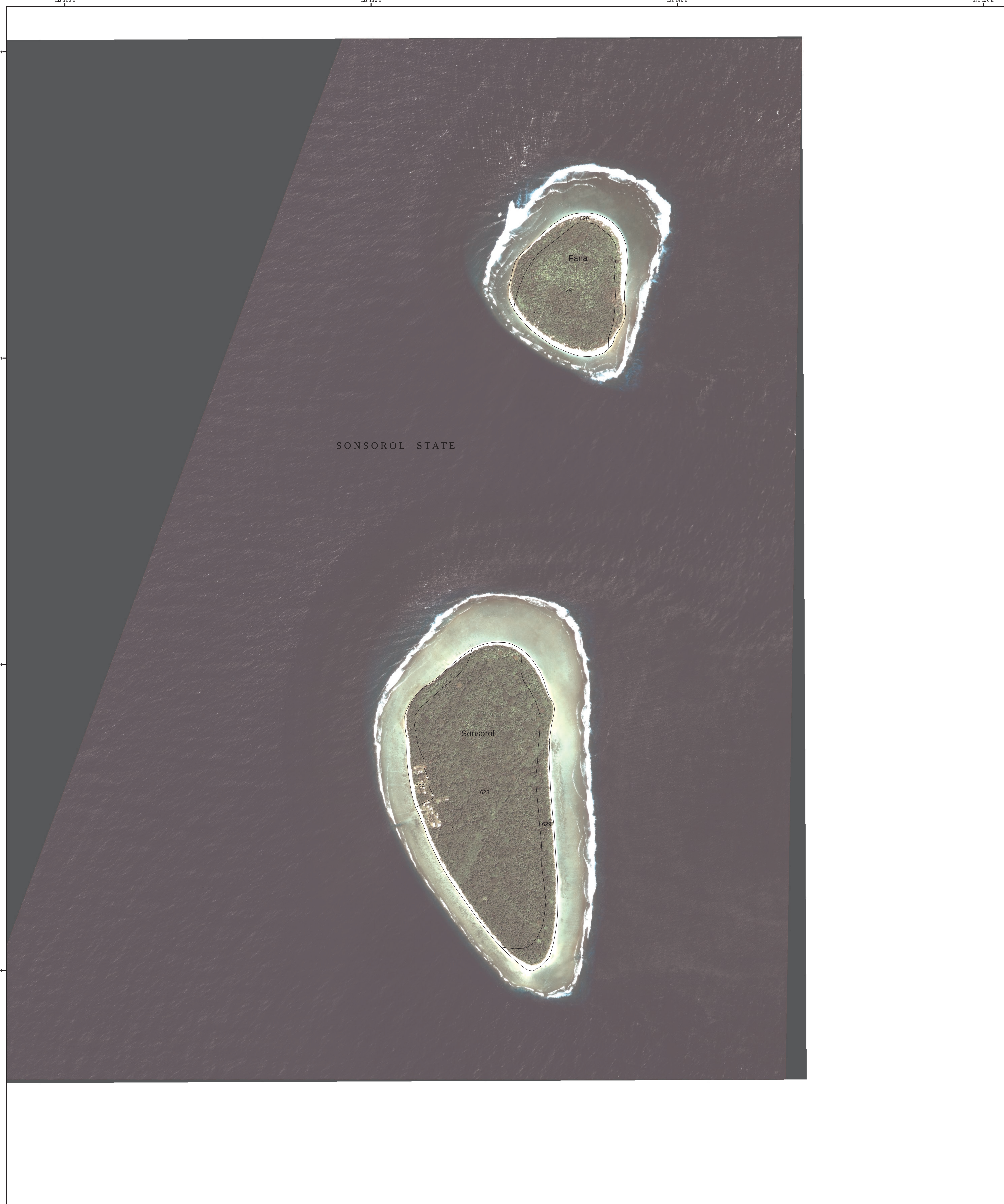

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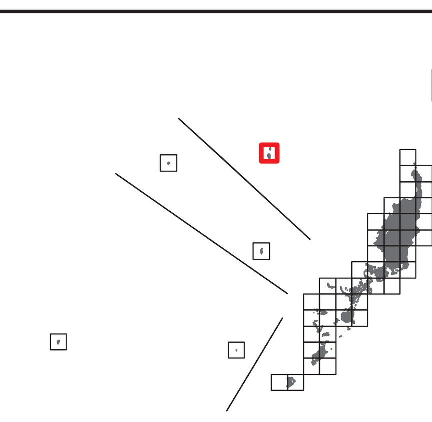
N

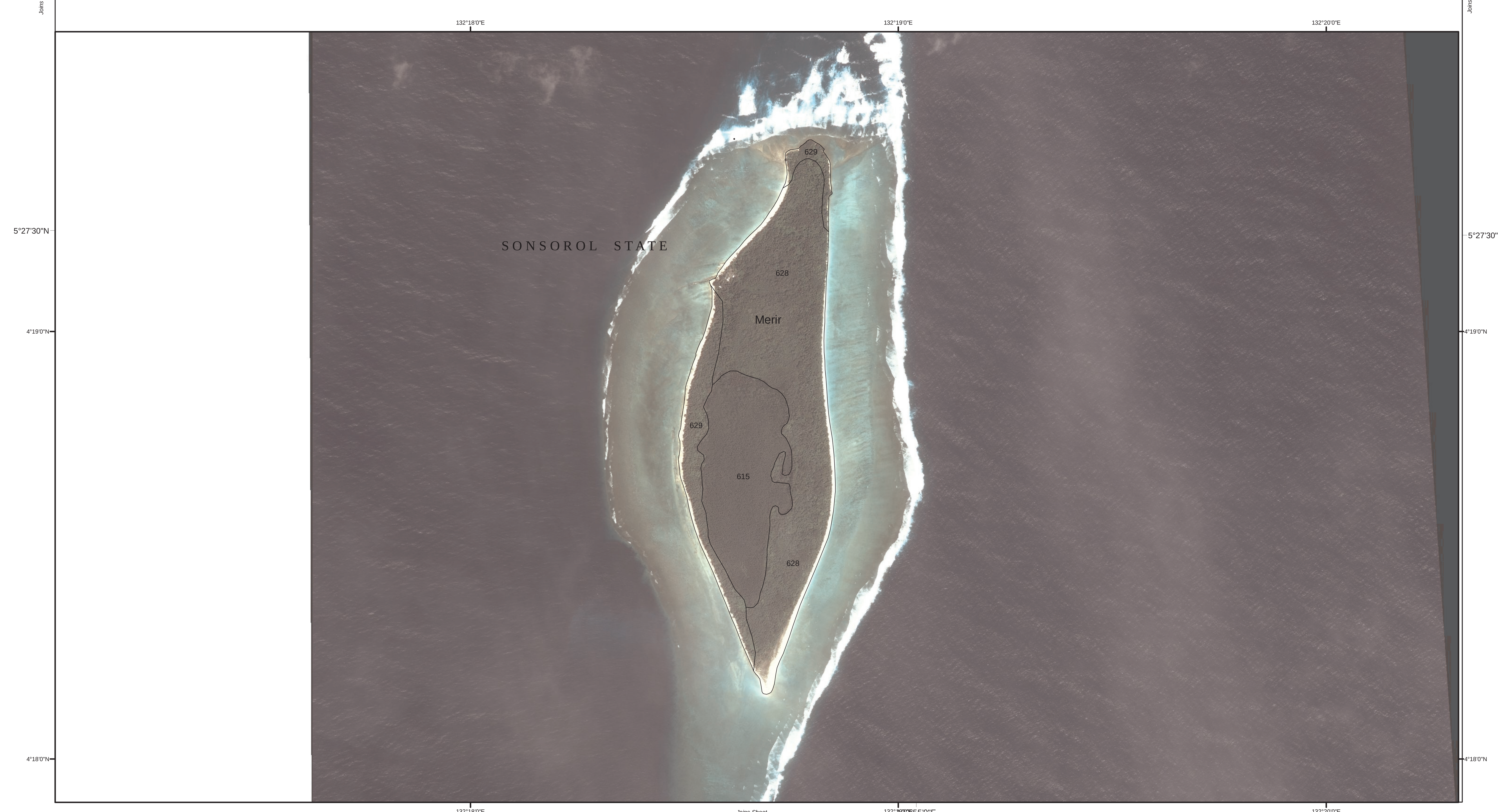
0.5 0.25 0 0.5
Miles

0.5 0.25 0 0.5
Kilometers

0 1,250 2,500
Feet

SCALE 1:12000





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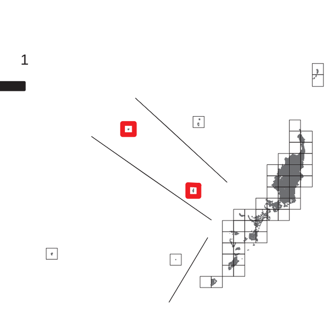
N

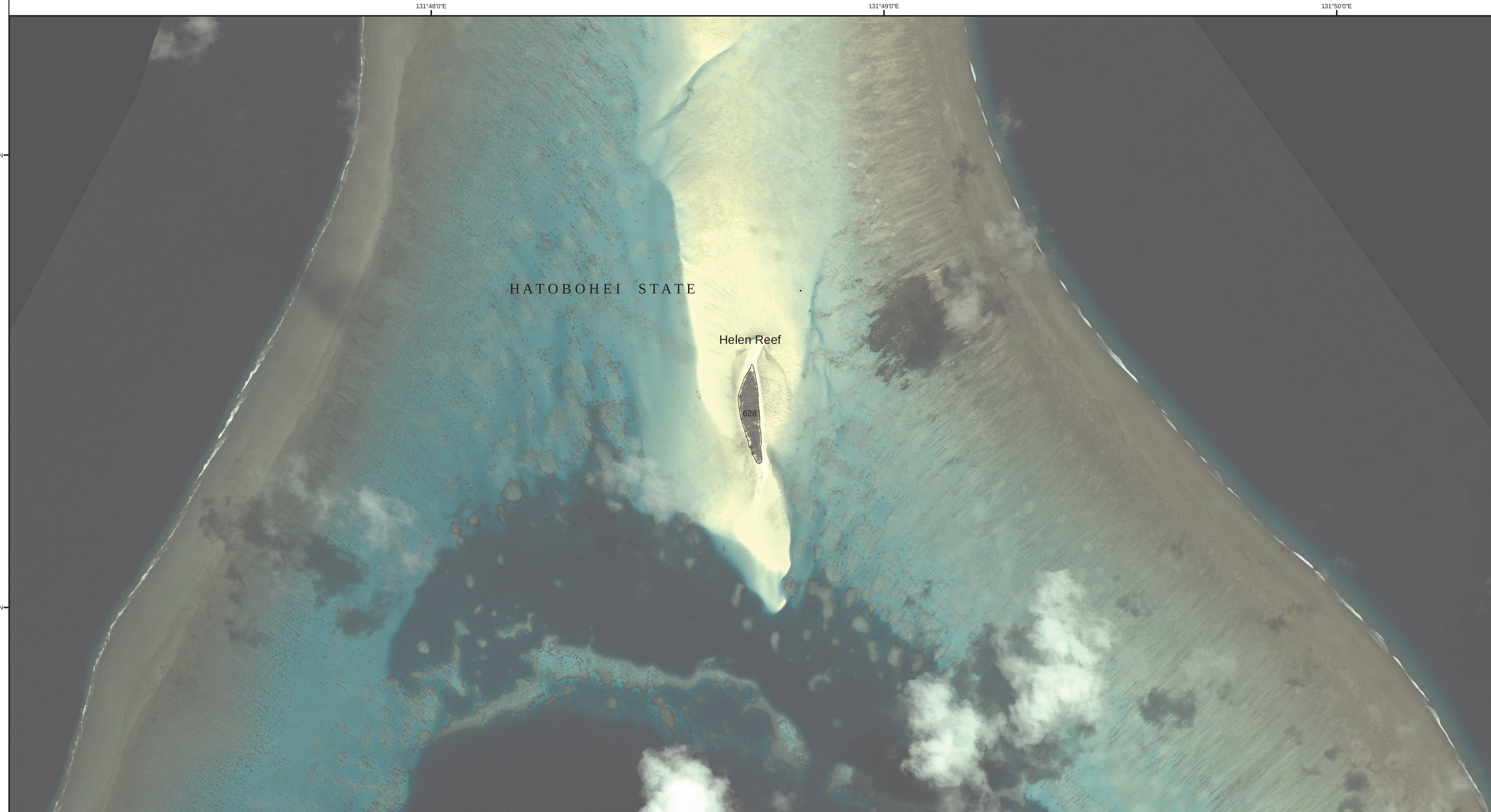
1 0.5 0 1
Miles

1 0.5 0 1
Kilometers

0 2,500 5,000
Feet

SCALE 1:00000





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0.5 0.25 0 0.5
Miles

0.5 0.25 0 0.5
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0 1,250 2,500
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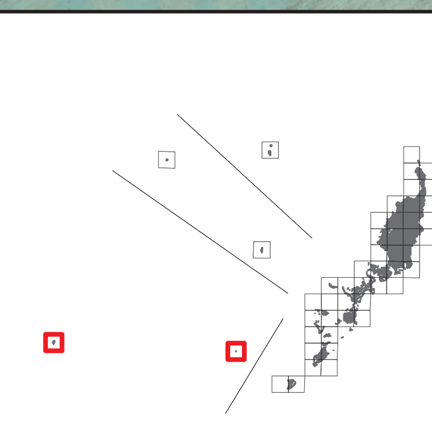

ISLANDS OF PALAU, REPUBLIC OF PALAU

SHEET 49 OF 49